SCIENTIFIC AMERICAN

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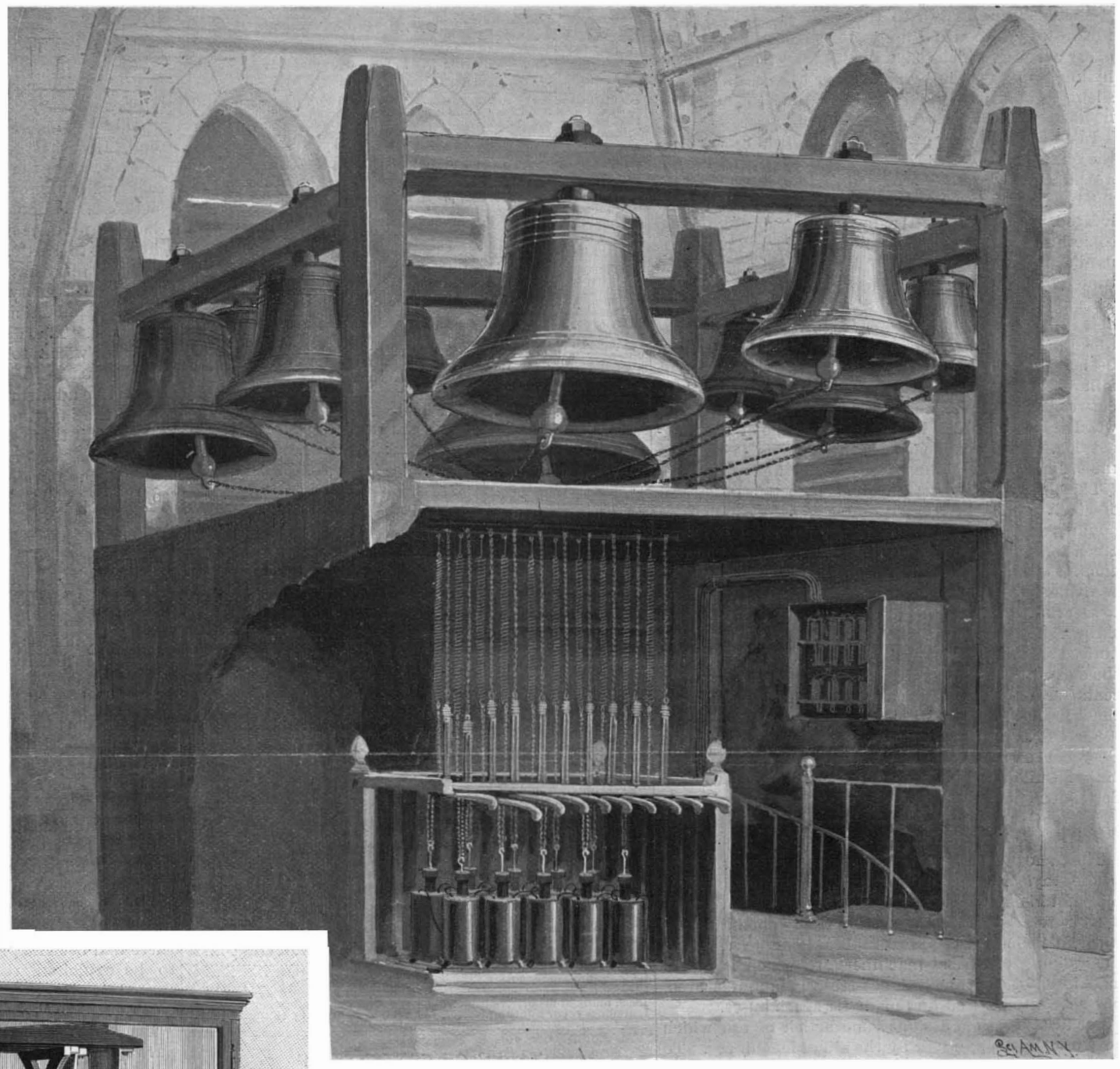
ELECTRIC TOWER CLOCK AND CHIMES, GRACE CHAPEL, NEW YORK.

One of the recent instances of the almost infinite utility of the electric current is to be found far up in the tower of Grace Chapel, New York, where electricity has replaced the weights of the tower clock, and not only turns its wheels, but also strikes the quarters and the hours and plays a curfew hymn at the close of the day.

And here it may be mentioned, in passing, that the Grace Church Settlement, as it is called, with its chapel, its hospital for aged women and children, its club houses and gymnasium, its parish house and clergy house, and its fine assembly room, is one of the most complete religious and philanthropic institutions of its kind. Generous wealth combined with good architecture and engineering have produced an establishment which, from the engine and boiler room in the basement to the electrical clock and chimes in the tower (the latter a gift from the Misses Potter, of Sing Sing, New York), is replete with the latest mechanical and architectural conveniences of the day.

As our readers are well aware, the usual method of running tower clocks is by means of dead weight, the weights being wound up at stated intervals. The improvement in the Grace Chapel clock consists in the replacing of the weights by a small electric motor, thus obviating the necessity of electrical contacts and the mechanical disadvantage of starting and stopping heavy hands, as in the ordinary secondary system of operating clocks. The clock proper, which, with the keyboard, is located in a small room in the tower, is of the ordinary tower clock pattern, and differs from this only in the fact that the barrel on which the weights would ordinarily be wound is empty. The novel feature is a tiny electric motor which is carried upon an extension of the base upon which the "works" are placed. The current is furnished from a storage battery which is charged by the Grace Chapel dynamo, and has sufficient capacity to run the clock for two weeks in case it should be necessary to shut down the dynamo. In clocks of this kind, where an independent plant is not available, current could be taken from the city mains.



THE BELFRY CHIMES SHOWING MAGNETS AND ATTACHMENTS TO CLAPPERS.

ELECTRIC SELF-WINDING CLOCK AND KEYBOARD.

ELECTRIC TOWER CLOCK AND CHIMES, GRACE CHAPEL, NEW YORK.

The motor shaft carries a small grooved pulley from which a coiled wire belt runs to a friction pulley on the arbor or shaft of the escapement gear, which is thus subjected to a steady pull, answering to the pull of the weights in an ordinary clock. Every movement of the escapement allows the shaft to rotate the required amount, and the resulting movements of the clock are transmitted by light hollow shafting to the tower clock dials. A cam on the minute shaft makes an electrical contact once a minute, and sends a current to a contact disk on the hour shaft. The disk is furnished with four contact points, which operate every quarter of an hour, to throw in a magnetic clutch and start the "Westminster Chimes" barrel, which will be noticed in the lower right hand corner of the clock. This barrel is similar to those which are used in a music box, being furnished with a number of pins which operate similarly to those of a music box cylinder. They do not strike the teeth of a comb, however, but

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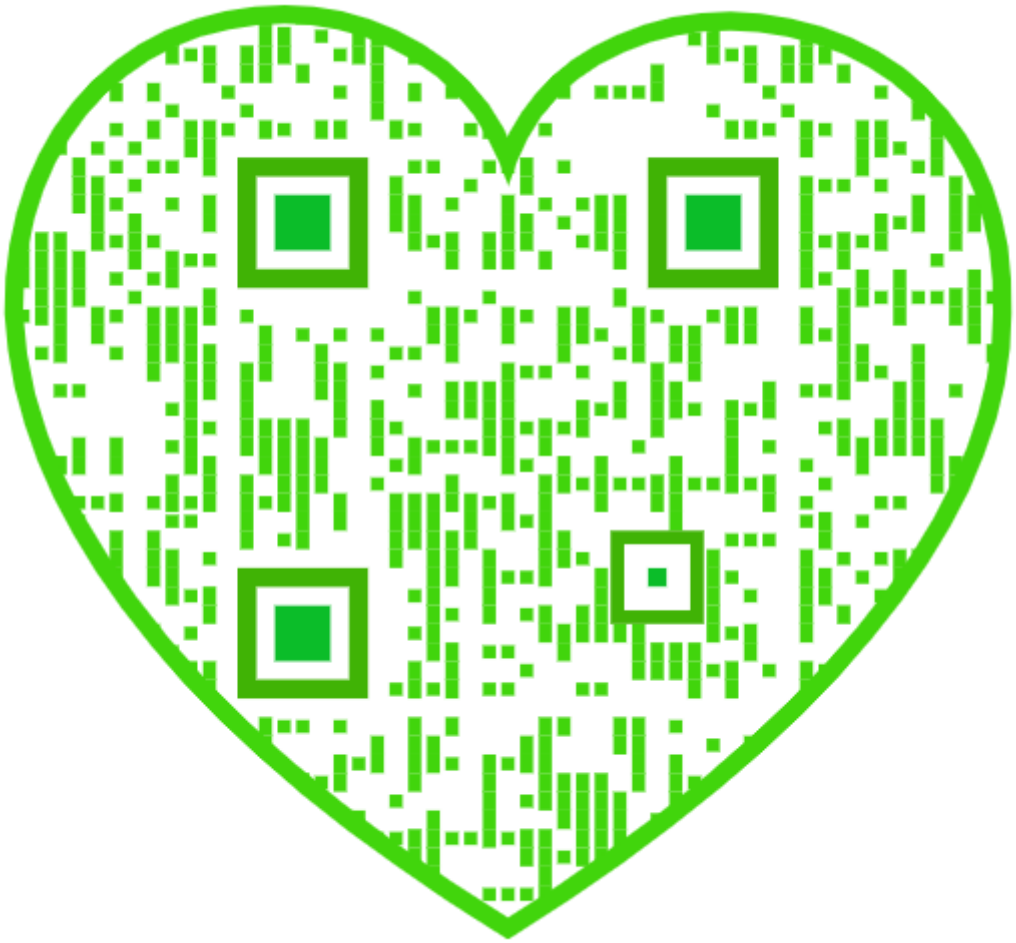

serve to lift a series of small electric keys and pass successive currents through a series of wires which lead up to the chimes in the belfry.

Beneath the ten bells are placed ten powerful solenoid magnets, one to each bell. Each of these consists of an iron armature, which hangs, when the magnet is not charged, just within and above the solenoid coil. When the pins of the rotating barrel below strike a key, a current is passed through the solenoid coil in the tower and the armature is pulled violently down within the coil. The chain by which the armature is hung runs up over a pulley and attaches to the clapper of the bell, which is thus caused to make one stroke for every contact.

A similar mechanism to that above described serves to throw in a wooden cylinder, or barrel, at nine o'clock every evening, which plays what is known as the curfew hymn; and after the hymn is played the clock remains silent through the night, in order that the neighborhood may not be disturbed by the bells.

In addition to the automatic mechanism for striking the quarter chimes, the hour, and playing the curfew, a separate keyboard is provided in the small room at the base of the tower in which the clock mechanism is located. It is carried in a box-like structure, shaped something after the fashion of a reed organ, and it is used every morning at nine o'clock for playing a hymn tune by hand, and also at the regular Sunday services. This keyboard has electrical connection with the magnets in the tower and operates in the same manner as the apparatus already described. In case there should be any breakdown of the electrical connections or failure of the current, each of the connecting chains between the magnets and the bells is furnished with a wooden lever which is hinged to the frame of the magnet box. This arrangement is the same as is used in the ordinary tower chimes for tune playing.

The chime consists of ten Meneely bells, the largest of which weighs about 3,000 pounds and the smallest 250 pounds, and to strike a sufficiently powerful blow on a bell weighing a ton and a half requires a considerable amount of force. As a matter of fact a pull is exerted equivalent to between three and four horse power, and to secure this the main current from the dynamo is thrown on by means of the relay box, which will be noticed attached to the wall of the tower. The cost of the current for running the motor is estimated at $1\frac{6}{10}$ cents per day, and the clock has proved to be a reliable timekeeper.

For the above particulars we are indebted to Mr. George F. Atwood, the designer of the clock, and to Mr. McCullough, the engineer of the Grace Church Settlement plant.

The American Machinist.

The fame of the American machinist extends everywhere, says a contemporary. His ingenuity in planning and his skill in execution are known wherever man uses machines and tools. If there is any one branch of work in which he excels more than in another, it is in the building of special machinery, by which is meant machines not kept in stock or regularly manufactured, but specially devised and made for special uses.

For instance, man designs some article of use which he works up by hand or by the aid of machinery. To produce this article in quantities, at such a cost that it can be sold at a profit, special machinery is required. The designer or inventor takes the article to the builder of machines and says: "Can you make a machine that will make these things, and will you guarantee it to work?" It is altogether probable that the machine builder answers "Yes" to both questions, because there is practically nothing that he cannot do.

Special machinery is built for a wide variety of uses. As the knowledge of American skill in this direction, now long familiar, has spread, orders have come from all over the world, and special machinery is sent from here also for use in enterprises installed or conducted by Americans in foreign countries.

Such machinery, for various uses, is shipped from this country almost everywhere. One big machine shop in this city that is largely engaged in the production of special machinery sends probably a third of its work out of the country. It has sent machines to every land.

A Suspension Bridge of Fence Wire.

A curious suspension bridge of fence wire was recently constructed across the Waukarusa River, in Douglass County, Kan. This stream, like so many other Kansas rivers, swells to a torrent at every large rainfall, so that it was impossible for the children living across the stream to go to the school house. The county engineer was asked to provide a remedy. He bought quantities of fence wire, boards and timber. He used good sized oak logs as piers. Strips of boards three feet long were fastened together with wire and over these strips was run a plank walk two feet wide. Each end of the superstructure was then anchored to the piers; the sides consisting of a network of wire, were then put up. The bridge is two hundred feet long and is sixty feet above the water. It is certainly a daring feat of homemade bridge construction.

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THE EXPANSION OF OUR FOREIGN TRADE.

If there is one fact more than another that is made evident by the events of the past few years of industrial depression, it is that a large extension of our foreign trade is a necessity if we are to have a return of our old-time prosperity. In spite of the rapidity with which the country has grown in population and wealth, and the ever lengthening list of what the average citizen considers to be for him the necessities and conveniences of daily life, the increase in our manufactured products is so rapid that there is always a surplus on hand. The national instinct—it is nothing less—for cheapening the cost of labor, and the ingenuity which has enabled us to lead the world in the production of labor-saving machinery, have enabled us to turn out our manufactured products with a speed and at a price which our old world competitors frankly admit to be entirely beyond their capacity.

The necessary consequence—an overloaded domestic market—was merely a question of time, and there is no doubt that the present so-called depression is largely an evidence of the fact that we have improved, and are continually improving, on our former methods of manufacture. It is not that we consume so much less as that we produce more speedily, more cheaply, and therefore in greater abundance.

The country has reached a point at which it has to choose between two alternatives: it must either curtail its production or find new markets in foreign countries. The day has passed when America can boast, or wishes to boast, of its absolute independence of the outside world, and in regard of our foreign trade it must be admitted that it is destined soon to become one of the supreme questions of the hour.

Why is it that one great section of the English speaking race has such a preponderating share of the foreign trade of the world, while the other has comparatively so little? It is not a sufficient answer to say that Great Britain's widely extended trade is altogether the outcome of her vast navy and mercantile marine, for this would be to mistake cause for effect. Her fleet of ships is as much the outcome of her commercial operations as her markets are the outcome of her omnipresent fleets. Each has served to build up the other, and both have poured wealth into the private purse and the public treasury of the people. The United States, on the other hand, have been so entirely occupied in developing the vast internal resources of the country that they have thought little and cared less for the foreign fields of commerce which were being occupied by British, French and German interests. While Great Britain has been shaping steel and iron into ships and engines, we have been turning them into rails and locomotives; and against the vast ocean fleets of the old world we have to show the 180,000 miles of track with which, mainly in the brief thirty years since the war, we have covered the land. If our ocean carrying trade had not been destroyed by the Confederate cruisers during the civil war, and if at the close of that war there had been no great area of undeveloped country to be exploited, this nation would doubtless have turned its attention to the upbuilding of its merchant marine and the extension of its foreign trade.

The time has come, however, when, if we are to hold our reputation as the most progressive race of the day, we shall be obliged to compete for a proportionate share of the foreign trade of the world. If we are to be successful in the competition, it must be carried out on scientific lines and on a liberal scale. No half measures will suffice; and it may as well be written down at once, that if we are ever to create and control markets on the vast scale that marks the operations of Great Britain, we shall have to adopt her methods, at least to the extent of carrying our goods in American ships. Any scheme for the extension of American foreign trade that contemplates the carrying of that trade in English or German ships may as well be pigeonholed at once. To do this is to pay toll both ways, divert a big share of the profits to an alien people, and carry a foreign yoke which is not the less shameful because it is self-imposed. The advantage of a nation's trade being carried in its own ships is shown by the figures of British trade and shipping. The latter, according to the latest figures, is credited with carrying seven-tenths of the world's ocean-borne commerce, and this includes not only the traffic between England and other foreign countries, but the traffic between these countries themselves. Apart from the great advantage which she thus secures in the matter of her own freights, there is a total annual tribute of about $800,000,000 paid by other nations to the British shipholder.

It is not within our province to discuss the share which the government, in its endeavor to promote foreign trade, should take in the upbuilding of our merchant marine; but we think it would be a wise and far-sighted policy to encourage this moribund industry by every legitimate means that can be devised and carried out. Coupled with this there should be a reform of our consular service, at least as far as the method of selection of our consuls is concerned. These should be chosen rather for their fitness to fill the highly important positions to which they are sent than for any

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political services they may have rendered to a particular party. The excellence of the reports which are continually sent in by many of our consuls shows what a valuable aid to the extension of our foreign trade this particular service may be made, and if it were entirely divorced from all political influences and its members retained and promoted entirely on their individual merits, the efficiency of the consular service could be largely increased.

CITY LIGHT FROM CITY REFUSE.

The costly experiment which the municipal authorities of Shoreditch, London, are carrying out in their new electric light station should be watched with close attention by the city authorities in all parts of the world. Up to the time of the opening of the new plant by Lord Kelvin, the inhabitants of this populous district had been entirely without electric light of any kind. This was due to the reluctance of the authorities to grant a monopoly to any private company, and also to their intention, ultimately, to put in a plant of their own. At the time when the question of lighting was finally settled, the question of the disposal of city refuse was also before the vestry, and with an enterprise that is strangely in contrast with their dilatory handling of the electric lighting problem, they determined to combine at once the destruction of refuse and the production of light in one plant.

The scheme, as finally carried out, is a very ambitious one, for in addition to the destructor and lighting plant, it includes on one site public baths and workhouses, a museum, a library and a technical institute, the total cost of the undertaking being about one million dollars. The works consist of an engine house, measuring about fifty by seventy feet, and a destructor house eighty feet square. The latter contains twelve destructor cells and six water tube boilers with 1,300 square feet of heating surface each. The refuse is carted to the yard and dumped into trucks, which are carried by an electric hoist to the top floor. Here the loaded truck is run along tracks to the top of the cell that is to be charged, and its load is dumped into a charging truck below, and thence it passes to the drying hearth and onto the grates of the furnace. Some 20,000 tons of refuse will be handled in a year, this being the amount gathered from this district, which is about a square mile in area and contains 124,000 inhabitants. It formerly cost about 76 cents per ton to carry this refuse away in barges, whereas now it will cost about 28 cents per ton to burn it in the destructor—a clear saving of 48 cents per ton at the outset.

The boilers are supplemented by a thermal storage vessel, and they are both designed to work at a pressure of 200 pounds to the square inch. During the daytime the steam from the boilers passes into the storage cylinder, where it is mixed with sufficient cold water to insure that by night time it will be full of water at the temperature and pressure of the steam used by the engines. The chimney is provided with a centrifugal dust separating chamber, in which all the particles which, passing through the chimney, would be a nuisance in the surrounding neighborhood, are retained.

The district for whose benefit this fine plant has been built is one of the most squalid in all London: ignorance, indifference, and poverty have combined to sink the inhabitants to the lowest levels of tenement life. The costly experiment—for it is yet in the experimental stage—will be watched both for its results as an engineering problem and as an attempted amelioration of the condition of its poor by the municipal authorities of a great city.

WEATHER PROGNOSTICATIONS.

The study of the weather and of conditions which produce heat and cold, dry or wet weather, grows more interesting each year as progress is made in a scientific way to foretell in advance what is likely to take place. The record of the movement of storm centers by means of the telegraph is pretty well understood, and the service of the United States Weather Bureau in promulgating news of their advance has been of inestimable value to commerce and to farming industries.

That many peculiar weather phenomena may be accounted for by certain astronomical conditions there can be no doubt, but whether there is any absolute law by which the phenomena are originated is still a matter of conjecture.

Mr. A. J. Devoe, of New Jersey, has made many observations, more especially as regards the relation of astronomical conditions to the production of weather peculiarities, and has undertaken to predict a month or so in advance what the weather is to be. Among other things, he predicted very cold weather for the first part of July, while it turned out to be very hot, but he also claimed there would be very heavy rains and floods about the middle of July in the New England States of the United States and in France, which, in a measure, truly followed. He also thinks another very destructive and violent storm is yet to come along the Atlantic coast about the last of July. Observers on the Atlantic coast will have a chance to note the verification of this prediction; meanwhile we imagine many will note that the direction of the wind and the barometrical pressure is also a pretty certain guide as to weather probabilities. The study of meteorology should be extended and be taken up more universally in the educational institutions of the country than it is. By systematic observations, duly recorded, working in harmony with the United States Weather Bureau, much valuable information could be gained.

DEATH OF PROFESSOR MAYER.

Dr. Alfred Marshall Mayer, one of the leading physicists of the United States and for the last twenty-six years professor of physics at the Stevens Institute of Technology, Hoboken, died July 13, at his summer residence at Maplewood, N. J. Professor Mayer was born in Baltimore, Md., 1836. He was educated at St. Mary's College, Baltimore, but left when only sixteen years old to enter the workshop and draughting office of a mechanical engineer, where he remained for two years. He then devoted two years to the study of analytical chemistry. At the remarkably early age of twenty years he was called to the chair of physics and chemistry in the University of Maryland. Three years later he accepted a similar position in Westminster College, Missouri. In 1863 he went to Paris, where he studied physics, mathematics and physiology at the university. On his return he was professor in the Pennsylvania College, Gettysburg, and Lehigh University, Bethlehem, Pa. In 1871 Professor Mayer accepted the professorship of physics in the Stevens Institute of Technology. He held this chair until last February, when he was taken sick. Professor Mayer received the degree of Ph.D. at Pennsylvania College, in 1866, and in 1872 was elected a member of the National Academy of Sciences. He was one of the associate editors of the American Journal of Science, and was until the latter part of his life a frequent contributor to the columns of the SCIENTIFIC AMERICAN, the most important of his contributions to the SCIENTIFIC AMERICAN being the "Minute Measurements of Modern Science," which was published in the SCIENTIFIC AMERICAN SUPPLEMENT, running through many numbers. His scientific researches have been principally published in the American Journal of Science, under the title "Researches in Acoustics." In all he was the author of a hundred articles and pamphlets, dealing with the several branches of science to which he devoted nearly all his life. He was also an enthusiastic sportsman and was the editor of one of the finest books on sports that has ever been produced, called "Sport with the Rod and Gun."

BRITISH TRADE MARK DECISION.

IN THE MATTER OF THE TRADE MARKS OF THE MAGNOLIA METAL COMPANY.

In February last, a motion was made in the High Court of Justice, Chancery Division, before Mr. Justice Kekewich, to expunge the trade marks of this company from the Register.

The marks were three in number, to wit: (1) The representation of a magnolia blossom or flower; (2) the same device, with the addition of the words, "Magnolia Anti-Friction Metal;" (3) the word "Magnolia" alone. Marks Nos. 1 and 2 were registered for anti-friction metal bearings, being parts of machinery other than horticultural and agricultural machinery in class 6. Mark No. 3 was registered for unwrought and partly wrought metal in class 5.

The alleged grounds of objection to the marks were that the word "Magnolia," as an essential part of mark 2, and standing alone in 3, had been used to designate the article, and not the manufacturer; second, because the word had reference to the character or quality of the goods; and third, because it was a geographical name. Objection was taken to the registration of marks Nos. 1 and 2 on the further ground that, at the time of registration, the assignors had no good will in anti-friction bearings, their trade being confined to the sale of the metal itself in ingots.

It appeared that the manufacture of this anti-friction metal was commenced in 1886, by Charles B. Miller, the predecessor of the Magnolia Metal Company, and that the term "Magnolia Anti-Friction Metal" was given to the compound, which differed in its composition from the many other anti-friction metals then on the market, to distinguish it from these products of other manufacturers.

The words "Magnolia Anti-Friction Metal" were always cast on each ingot, and, in addition to that, the representation of the magnolia flower was also impressed thereon.

The metal has been widely advertised and has gone into very general use, and by a process of abbreviation the words "Anti-Friction" have been gradually dropped by the public and consumers, and the metal is now popularly known and referred to as "Magnolia Metal." The metal was patented in England in 1890, and the patent is still in force. On the argument further objection was made to the use of the word "Magnolia," on the ground that it had become the name of a patented article.

In deciding the motion, Justice Kekewich held that the word "Magnolia" was not geographical, and decided in favor of the marks as to that point; but he held that the name "Magnolia" was descriptive of the alloy, and should therefore be expunged, and also that as to the flower the registrants had no good will at the time of the registration as to the class of goods for which it was registered. The marks were thereupon ordered expunged.

The owners of the marks appealed from this decision to the Court of Appeal, and the appeal was heard on May 12, before Lords Justices Lindley, Lopes and Rigby.

The judgment of the court, which was read by Lord Justice Rigby, affirmed the decision of Justice Kekewich as to the fact that the word "Magnolia" was not geographical, and as to his conclusion that the word "Magnolia" was descriptive of the article; but reversed his decision that the company had no good will in the class of merchandise for which the representation of the magnolia flower had been registered.

By this decision, the Magnolia Metal Company's exclusive right to the use of the flower as a trade mark was sustained, but the word "Magnolia" was declared to be impossible of exclusive appropriation.

The court evidently wholly disregarded the objection based on the fact that the metal had been patented, for the Lord Justice said: "In this case, however, it is not really necessary to rely upon the patents taken out. For years before these patents were taken out, and before the trade marks were registered, the word 'Magnolia' had been treated with and without additions thereto as the name of an article manufactured by a secret process and therefore presumably incapable of appropriation by being registered as a trade mark." The case most strongly relied upon by the petitioner's counsel was the well-known "Linoleum" case.

This mark has been rendered immensely valuable by the extensive advertising and the high reputation of the Magnolia Metal Company, and this decision, which apparently throws its use open to the British public, to those familiar with the attitude of our courts toward the owners of trade marks seems inexplicable, unless indeed an explanation can be found in the statement of Lord Justice Rigby that "Magnolia" had been treated with and without additions as the name of the article. If from this statement it is to be understood that the evidence showed that the metal was known simply as "Magnolia," as linoleum is known as "Linoleum," then the decision is in harmony with the "Linoleum" case; but it seems hardly possible that the evidence could have warranted this conclusion. Certainly the facts do not, to the minds of those familiar with the subject. The metal is invariably referred to as "Magnolia Metal" or "Magnolia Anti-Friction Metal," and the difference between this and the "Linoleum" case is therefore radical. "Linoleum," for instance, is the name of the product, by which it is designated absolutely, without addition. The desire of a customer asking for "linoleum" would be understood by a merchant at once, whether he dealt in the article or not; but if the merchant received an inquiry for "Magnolia," he would be wholly ignorant as to his customer's wishes. If he were a liquor dealer, he would expect to supply "Magnolia" whisky or "Magnolia" gin; if a tobacconist, he would certainly furnish "Magnolia" tobacco; and if a hardware merchant, he would probably be unable to decide between Magnolia Boiler Compound and the Magnolia Anti-Friction Metal.

We understand that the Magnolia Metal Company has appealed from this decision to the House of Lords, and, in view of the magnitude of the interests which are affected by this decision, it is to be hoped that the judgment expunging the mark will be reversed. If followed to its logical conclusion, the judgment will in England absolutely prevent any one from acquiring a trade-mark on any new product or even on an old product produced by a new or improved method.

It is safe to predict that this English decision will receive scant consideration as a precedent in our courts.

ANDREE STARTS NORTH.

A dispatch from Tromsöe says that on July 11, the winds being favorable, Prof. Andree, who hopes to reach the north pole by balloon, ordered that a start be made as quickly as possible from Dane's Island. Preparations for getting the balloon away occupied three and one-half hours. The wind was light and the balloon quickly rose to a height of 600 feet; it then dropped nearly to the surface of the sea, whereupon sand bags were thrown out, after which it ascended. At this time the breeze had freshened, carrying the balloon, which has been named the Eagle, north-northwest at the rate of twenty-two miles an hour. The weather was clear and the balloon was visible for an hour. With Andree are Dr. Ekholm, the eminent meteorologist, and Nils Stringberg, a Stockholm scientific man. We have already described the balloon in detail.

Immediately before his departure Prof. Andree wrote a telegram expressing the hope that he would gradually get into a region where the wind would be more favorable. The dispatch ended with greetings to his friends and his country.

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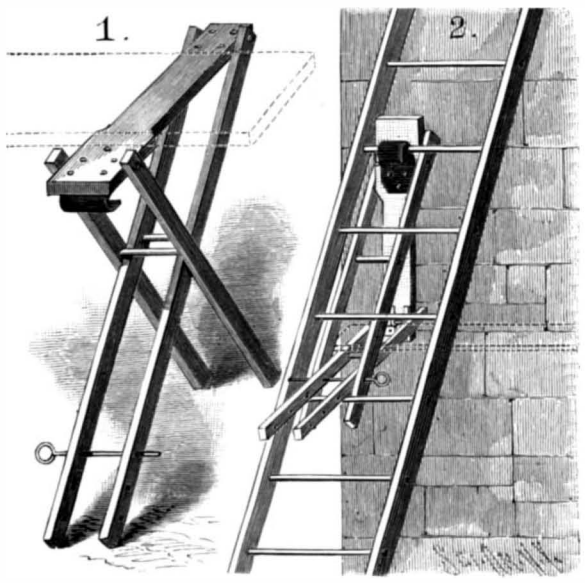
AN IMPROVED TRESTLE.

A device adapted for use in a number of different connections, as for the support of material on horizontal surfaces, holding scaffolding on ladders or hoisting devices on the ridges or combs of roofs, etc., is shown in the engraving, and has been patented by Samuel S. and William L. Claar, of Bedford, Pa. It is shown in Fig. 1 arranged for a horizontal support and in Fig. 2 supporting scaffolding on an inclined ladder. The body or platform member of the trestle has one end slightly larger than the other, and in each end are



TRESTLE OF S. S. AND W. L. CLAAR.

journaled legs rigidly connected by cross bars. The legs on the smaller end are adapted to swing between those on the larger end of the body, and the free ends of the legs have transversely aligned openings to receive a pin. On the under side of the larger end of the platform section is a plate receiving the journal pin of one of the pairs of legs, and the outer edge of the plate is turned to form a hook flange and adapted to engage the rungs of a ladder. These trestles may be folded into compact form for transportation.

THE WINTON MOTOR CARRIAGE.

After the recent unsuccessful motor carriage competition in England, it is satisfactory to note that several firms in the United States are now really in a position to make and deliver motor carriages. For a long time it was impossible to buy a motor carriage at any price, but, happily, this day has now passed. The horseless carriage which we illustrate is made by the Winton Motor Carriage Company, of Cleveland, O. On September 1, 1896, Mr. Winton, the president and master mechanic of the company, completed his first motor carriage. It has been in constant use since that time in all kinds of weather and over all sorts of roads. On Decoration Day he ran the carriage over a mile on a circular track in 1:48, thus breaking all records. On June 12 the carriage was given a road test of sixty miles, from Cleveland to Elyria and return, and proved its perfect utility for every purpose to which a horse and wagon could be put. The day was warm and the roads were undergoing repairs, so that for a distance of six miles the carriage had to travel through a bed of sand. The trip was made without a hitch, carrying four passengers, and consumed only six gallons of gasoline. Five miles of the route were covered in sixteen minutes, and the running time for the sixty miles was five hours.

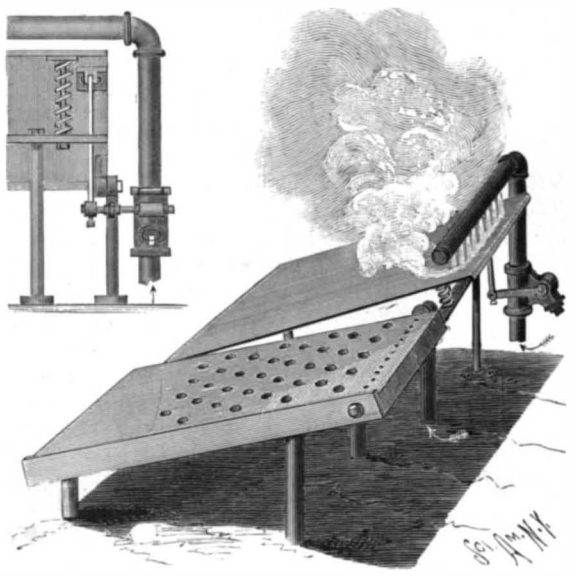
As will be seen by reference to our engraving, the Winton motor carriage resembles an ordinary trap with seats back to back. The carriage is wide enough to seat six persons comfortably. The motor and driving mechanism is bestowed in the body of the vehicle, and are self-lubricating. The ten horse power motor of the hydrocarbon type is almost noiseless, odorless, and free from vibration. The fuel is gasoline, seven gallons being carried on the carriage. A patent feeder converts it to a fixed gas before entering the cylinder without the aid of a carburetor. It is very economical, and costs less than a cent per mile over ordinary roads and through the streets. Among the special features of the motor are the igniter and the pneumatic governor, which places the machine under perfect control. By pressing a button the speed can be increased and held anywhere from zero up to the maximum power of the motor. The carriage is operated by a lever, which at will engages, releases and reverses, or applies the brake. The steering gear is simple and easily handled. The rear wheels are thirty-six inches in diameter, the front wheels are thirty inches in diameter. They are provided with nickel spokes and three inch pneumatic tires. Ball bearings are used throughout, thus securing the greatest possible freedom from friction and wear. The body is supported by easy riding springs. It is handsomely finished in polished natural wood. The trimmings are nickel and the cushions and the dashboard are of leather. As will be seen by the engraving, the motor carriage is much handsomer than vehicles of this kind are apt to be. The weight of the entire machine is 1,800 pounds.

Dedication of the Yerkes Observatory.

The formal dedication of the Yerkes Observatory will take place October 1, 1897. It is hoped that European men of science who purpose to attend the Toronto meeting of the British Association for the Advancement of Science, in August, will be there to take part in the formal inauguration of the Yerkes Observatory. A series of informal conferences on astronomical and astrophysical subjects will be held in connection with the dedicatory exercises. A cordial invitation is extended by the director of the observatory to all men of science who may be willing to honor the observatory by their presence on this occasion.

REMOVING SCALE FROM METAL PLATES.

To facilitate the removal of scale from steel plates or sheets, and particularly for operating upon plates for saw blades, the apparatus shown in the accompanying illustration has been patented by Thomas H. Desmond, of Middletown, N. Y. Extending transversely near the upper edge of a fixed inclined table is a water delivery pipe having perforations extending through the top of



DESMOND'S SCALE REMOVING APPARATUS.

the table, the pipe being connected with any desired source of supply, and the upper surface of the table being corrugated or having concavities or cups. At the side of the fixed table is a swinging table, hinged at one end and its opposite end supported by springs, and extending over the upper end of this table is a steam spraying pipe, having a slit or series of perforations in its lower side, the spraying pipe being connected with a supply pipe controlled by a valve actuated by the swinging of the table, as indicated in the small figure. As the hot plate is held and moved about by tongs on the fixed table, water is constantly running over the table under the plate, the water in the concavities affording a suction to prevent the plate from jumping too much. After the scale has thus been loosened and partly removed, the plate is similarly handled on the swinging table, where the weight of the plate depresses the springs and lowers the upper end of the table, a movement which opens the valve and causes the discharge of steam upon the plate, to blow off the scale and entirely clean the plate. Upon removing the plate, the table returns to its normal position and closes the valve.

THE WINTON MOTOR CARRIAGE.

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TRICK RIDING.

Bicycling, like all other sports, has, besides a vast number of adepts, produced its phenomenal artists. Some we admire for their remarkable strength and endurance, which enables them to establish such records as the track and the road have seen.

Others are distinguished rather by agility. An American, Mr. Valdare, has performed in a photographic atelier before the correspondent of La Nature the tricks our illustrations (taken from that French paper) show. They are all done on an ordinary roadster. In the first cut we see Mr. Valdare stretching his body over the handlebars, and, supported by them, he turns the pedals with his hands. Then, riding on the front wheel, he grasps the handles behind his back and, throwing his weight on the fore part of the machine, he treads the pedals with his feet (No. 2).

In the third position he sits on the handlebar, and in that position propels the machine backward, achieving one of the hardest bicycling feats (No. 3). The fourth cut shows a novel way of mounting. It is executed with such graceful ease by the artist that riders of the wheel might imagine, on seeing it done, that this is the easiest way of mounting that could be (No. 4).

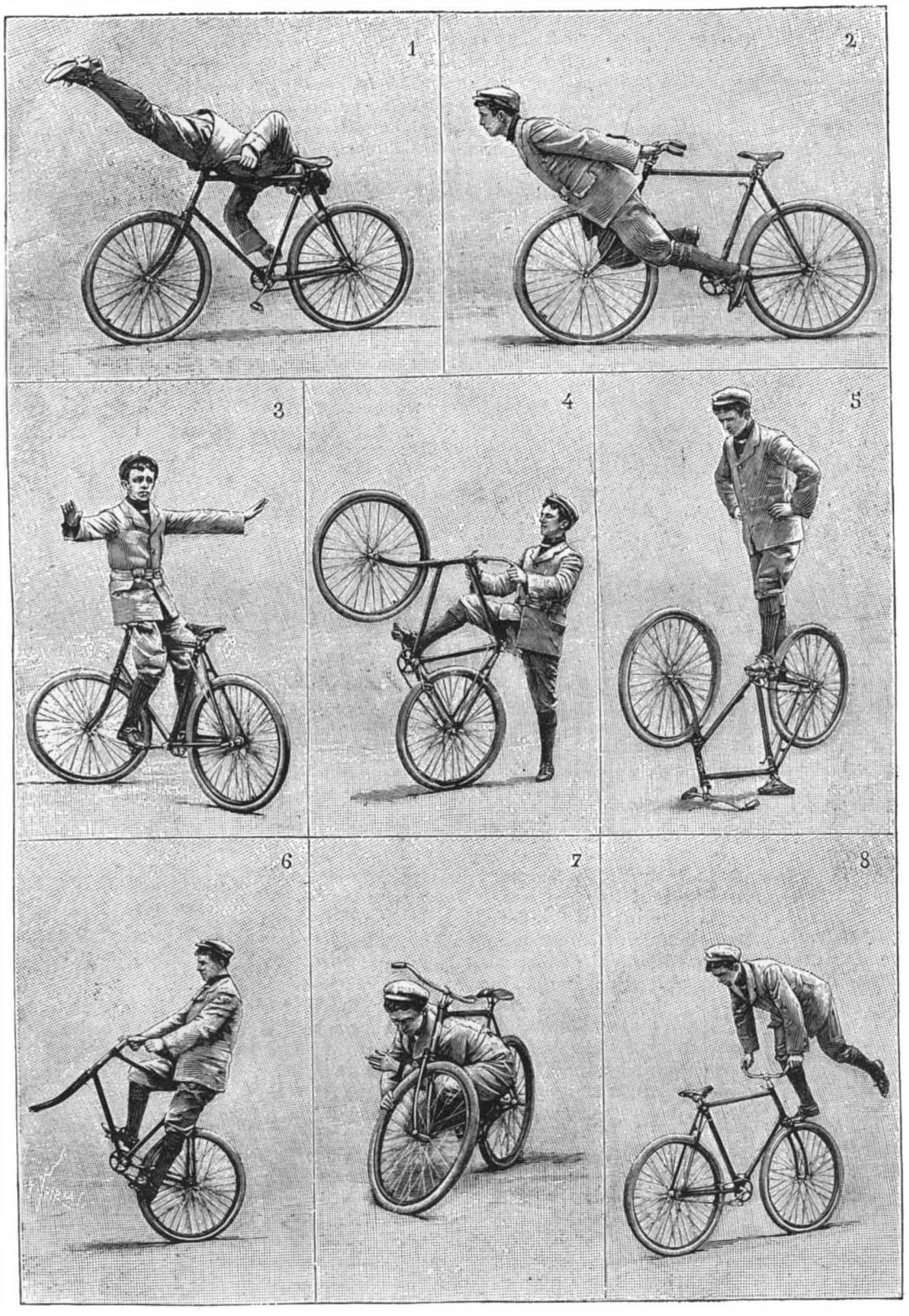
Then he turns his wheel over, resting it on the handle and saddle, rises upright on the pedals and treads them as if he were sitting in the saddle (No. 5). Our sixth drawing does not fully show the exercise in question, which consists of two moves.

Mr. Valdare loosens the nuts which hold the front wheel in the fork, then mounting, he gives the wheel a certain amount of momentum, gives the fork a sudden jerk, so that the wheel is set free and continues on its way, while he keeps his seat, and goes on on his unstable and uncomfortable monocycle.

The seventh exercise is executed either in motion or at rest. It is the one which strikes the public most, for it requires wonderful suppleness and equilibristic faculties. The cyclist is on his machine, and giving it a fairly rapid circular motion, passes through the frame from left to right, and is again in the saddle, all without touching the ground (No. 7).

Another exercise consists in sending the wheel along by treading the front wheel alternately with the left and right foot, holding the handles as in our eighth cut.

The exercises we have described are only those which can be rendered by photography. Some others are interesting only for the motion which they show, such as riding backward, a very difficult feat, as any one possessing a bicycle may ascertain.



TRICK RIDING BY MR. VALDARE.

Largest Camera in the World.

An enormous camera has been constructed and is now being used in San Francisco. It found its necessity in the Fair will contest, and was conceived and built by Theodore Kytka, the artist and expert in micro-photography and chirography. Mr. Kytka, who was employed by McEnerney & Goodfellow to investigate the pencil will the day on which it was filed, believed the document to be a forgery. Charles Fair's attorneys, Knight & Haggerty, decided to take every possible means to establish Kytka's theory. So they built this camera.

With it an exact reproduction of any writing can be magnified 3,600 times. This means that a letter one-twentieth of an inch in height can be accurately pictured 15 feet tall. In this way, photographing one minute section after another, the pencil will could be reproduced so that each page would be 3,000 feet wide and 5,100 feet long.

Mr. Kytka's studio was not large enough for this giant camera. In consequence, it has been built in two rooms. The telescope part, which is made up of twelve sections or bellows, each supplied with a little side door entrance, is 25 feet long when extended to its full capacity. This is connected by a black rubber cloth with an adjoining room used as a dark room. In this way the dark room became the plate holder of the camera, and in it the expert works, directing his assistant on the outside in altering the focus and lights till a satisfactory result is attained and the photograph is taken.

When the investigation of the will began, there was a sore lack of appliances. Photographs of the document were made as large as possible with ordinary cameras and lenses. These were given to the different photographers of the city for enlargement, but the results were not as satisfactory as hoped for. In each there were evidences of marked distortion. There was a lack of sharpness and precision in the lines and a sacrifice of detail in the general effect.

A little over twelve months ago C. P. Goerz, a scientist of Germany, invented a new lens. In this there were six lenses ground into one. They were all so adjusted that, no matter how great an object was to be magnified, it could be directly reproduced without the slightest distortion. This lens was of no value in making ordinary pictures, but in bringing out lines exactly and exposing the fiber of paper it was unequaled.

This settled the greatest of the difficulties. The possibilities of employing the camera with the Goerz lens in simplifying the points they wished to make no sooner became evident than a lens was ordered. The wonderful exactness required in its construction may be judged from the fact that though it is only about two inches in diameter, the lens required four months for its manufacture, and then cost $185.

Upon the arrival of the lens, work was at once begun in examining the documents in question from every standpoint. Under the power of his new instruments, reinforced by powerful electric lights, Mr. Kytka showed erasures that before had only been conjectured.

In order that there might be no possible escape from his arguments, Mr. Kytka began a collection of pencils. A sample of every pencil obtainable in this country and Europe was secured, and the marks made by these pencils (of which there are now more than 2,400) were analyzed under different conditions, photographed and photographed again after erasure had been made.

The results obtained were a revelation, says the San Francisco Examiner. Never had there been constructed so elaborate a plant in this country or in Europe. The police employed this camera to assist in the Becker and Creegan case, where a check on the Nevada Bank was raised from $12 to $22,000. The first work to be done was to show that the check for $22,000 was a forgery. The process employed was as simple as it was effective.

The check was placed between two sheets of glass and in focus before the camera. It was then photographed, enlarged several times with a strong reflected light from behind, emphasizing not only the fiber of the paper but the lines on it. That photograph told the whole story. The camera brought out faintly the letters "lve" which had been erased with acid by the forgers before they changed the word "Twe-lve" to "Twenty Two Thousand." What was more, the ink in the first three letters was shown to be different from the rest. The photograph showed too that the original check had been blotted, while the letters that had been painted in were allowed to dry. The patches that had been used in filling the holes in the paper of the check made by the perforating machine were also made evident.

Kinds of Lace that Exist.

The question having been asked as to the kinds of laces known, it may be said that their names are many. A partial list of laces would begin with Albisola and conclude with Ypres, as follows:

Albisola, Alençon, Brussels, Antwerp, Appliqué, Aras, Auvergne, Ave Maria, Baby, Balloon net, Basket, Bayeux, Beaded, Beggars, Bilinent, Blond, Bisette, Bobbin, Bone point, Border, Bourg Argental, Bride, Broad, Buckingham, Burano, Cadiz, Carnival, Cartisane, Caterpillar point, Chain, Chantilly, Chenille, Cluny, Cordover, Cork, Cretan, Crewel, Crochet, Crown, Dalecarlian, Damascene, Darned, Devonshire, Diamond, Dieppe, Dresden point, Duchesse, Dunkirk, Dutch, Ecru, English point, False Valenciennes, Flat point, Flemish point, Fuseau, Genoa, Grammont, Gueuse, Guipere, Henriquez, Hollie point, Honiton (made in Devonshire, England), Jesuite, Knotted, Lille, Limerick, Macrame, Mechlin, Mignonette, Miercourt, Needle point, Oyah, Parchment, Pillow, Plaited point, Pot (from pattern introduced), Powdered (covered with small flowers and dots), Saxony, Spanish, Statute (lace made in accordance with sumptuary laws), Tambour, Tape, Thread, Torchon, Trolley, Valenciennes, Ypres.

The Roentgen Rays Applied to Mining.

Dr. F. E. Yoakum, of Los Angeles, Cal., has applied the X rays to the determination of gold in quartz. The physician was photographing a tumor; there was a vacant space on the plate, and he placed a piece of gold-bearing quartz on it; when the plate was developed the outlines of the rock came out on it, with specks here and there, which showed the presence of gold. Since then he has taken a number of pictures of gold in valuable ore. The fluoroscope has been used for this purpose. It is believed that the discovery will be of use to geologists and mineralogists in prospecting.

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Our Improved Varieties of Oranges.

BY GEORGE ETHELBERT WALSH.

The orange crop of Florida, partly recovering from the severe freeze of two winters ago, again looms up to play an important part in the prosperity of that State, and incidentally to affect the food markets of the world. The golden fruit that Florida has brought to perfection, and California has multiplied in such enormous quantities that the disposal of the crop has become the chief problem of the growers, was formerly a luxury of the sick room in this country, but to-day it is almost a necessity, and one of the staple products of the land. In seasons of plenty the orange appears on our tables as freely as apples, and, like all other fruits that are toothsome and healthful, its consumption is increasing by the invention of many curious and novel ways of serving it as dessert.

Before the freeze of two winters ago, Florida had about five million boxes of oranges on the trees, and to fill the vacuum caused by the catastrophe, California sent to our Eastern markets more than half her crop, while from Jamaica there has come enormous importations of these fruits. The California oranges do not begin to arrive before January, and, as there was no other crop ripe except that of Jamaica in time for the holiday season, the growers of that tropical island realized greater profits than any time during the past ten years, and they shipped over eighty thousand packages to us, each containing about three hundred and fifty oranges.

Considering quality alone, the Florida grafted oranges are the finest and most toothsome in the world, and their increasing supply this season will be appreciated by thousands of disinterested lovers of good things. But varieties are multiplying so rapidly that it may not be long before the old standard oranges will be replaced by something better and more succulent. Horticulturists are working diligently in the field of orange culture to produce fruits of a finer flavor, with more juice and less pulp, and without seeds or thick skins. The climate of Florida appears to be best adapted to such experiments with the citrus fruits, but California has been foremost in the field in producing new and astonishing varieties.

The Washington navel orange is partly the result of intelligent crossing and grafting, and partly due to pure accident. It now forms the chief fruit of the famous Riverside fruit region, and nearly a million trees are budded with this variety. This peculiar freak of nature in oranges, which has practically made the reputation of Riverside, sprang from a couple of trees, budded from orange trees imported from Bahia, Brazil, in 1873, by the Department of Agriculture, and sent to Mrs. L. C. Tibbets, of Riverside. The tree is a semi-dwarf and is almost thornless, while the orange is the abortive attempt of nature to produce twins. The navel orange did not come into prominence until the New Orleans Exposition, in 1885, when it received the first premium and took the palm from Florida. Since then it has stepped boldly to the front, and commands high prices in every market where it appears. Most of California's seedling groves have been cut back and grafted with the navel orange, and it will soon comprise the greater part of her shipments. Unlike most of California's oranges, the navel ripens early enough for the Christmas holidays, although it does not, by any means, reach perfection until much later. Its most perfect period of lusciousness is not until March.

While the navel is the chief glory of California's orange groves, it is not the highest priced in the market. The blood orange is considered the finest, but connoisseurs differ on this point. The comparative scarcity of this sport or freak orange makes it very expensive. It is not extensively raised because there is no certainty of obtaining pure blood oranges from trees that have produced them in the past. The reddish color of the pulp is its chief distinguishing virtue. Specimens of the blood orange are apt to be found in every box from the Mediterranean.

The Mediterranean sweet is a fancy name given to a very desirable variety of orange from the shores of the Mediterranean, but the finest fruits raised in Europe cannot equal the ordinary grafted Florida oranges, no matter by what name they go. As an instance of the peculiarity of the climate or soil of Florida in changing the character of oranges, mention should be made of the importation of one hundred boxes of Rodi oranges last summer. The seeds of these orange trees were obtained from the groves on the Indian River, and were planted at Rodi, where they have produced a small crop of fruits much superior to and sweeter than the old Rodis, which have heretofore been considered the finest oranges grown in Mediterranean countries. Scions from the new trees will be grafted upon many of the native Italian trees, and hereafter we will have regular summer importations of Florida-Rodi oranges.

The peculiarity of this experiment is more apparent when we remember that some twenty-five years ago many of the orange groves were started in Florida from seeds obtained on the shores of the Mediterranean. In fact, the old Indian groves planted around St. Augustine, hundreds of years ago, sprang from seeds brought by the priests from Spain, and now after the fruits have been improved by their new surroundings, they have been sent back to their original home to rejuvenate the old stock. Whether the qualities of this new stock will last, or run out in a few years, is a question highly interesting to horticulturists and not to be answered easily.

California Washington navel oranges were planted in Florida several years ago, and thrifty trees are now growing from them, and in a year or two they will come into bearing. In the results of this experiment also there is great interest displayed, for the future of California's orange crop will be influenced more or less by them. Should Florida improve upon the Washington navel, and add some delicious, undefinable quality to it, California would not gain much by the experiment. There would be added luster to the fame of the navel orange, but it would be the new Florida navel, and not the California Washington navel. But it remains to be seen whether Florida soil or climate has some secret process by which all oranges can be transformed and improved as if by magic.

"Florida oranges" are better known by this distinctive name than by any variety term, but in recent years the Indian River oranges, and the Russets, have stood out conspicuously from all the rest, and as the business increases there will be more specific names applied to the leading varieties. The Indian River region can boast of the finest oranges in the world, and, either as a result of the richness of the soil, or a peculiar effect of the salt air upon the fruit, the oranges gathered from this place are invariably superior to any others grown in Florida. They are large, thin skinned, sweet, and juicy fruits—"perfectly delicious," as they have been very aptly described by a woman connoisseur. Orange land along the banks of the Indian River is consequently the highest priced in Florida. The river also protects the fruits from severe cold weather, and owing to this the orange is free from frosts in a latitude further north than elsewhere in the peninsula State.

The Florida Russets are peculiar to the "land of flowers," and they have become well known in our markets as the very opposite to the "brights." The latter differ from them only in being free from the scale which gives the singular russet color to a great deal of the fruit raised in Florida. This russet coloring is caused by a minute scale, which closes the pores of the skin and in time hermetically seals the fruit. When the scale first appeared upon the Florida orange it was considered a great injury to the fruit, but subsequent experience has shown that the russet covering is a positive benefit. It may not improve the coloring of the fruit, but it invariably helps to preserve the orange, and retains the juice for a much longer period than would ordinarily be the case. Good russet oranges that have been in the market for a long time are always juicier than "brights" that have been picked from the tree the same length of time. The reason is that the juice of the former cannot evaporate so easily through the russet scale as it can through the porous skin of the "brights."

The Jamaica orange, which has been seen so abundantly in our markets since the Florida trees were injured by the freeze, is another variety that differs from any yet mentioned. It is a lighter colored fruit than the Mediterranean, California, or Florida orange, and both the skin and pulp resemble in appearance the lemon more than the orange. The Spanish explorers undoubtedly carried the orange to the West Indies, and thence it reached the mainland of the New World. In its new island home the fruit changed its characteristics in many ways. It grew sweeter and juicier, but under neglect it never reached that stage of perfection it has attained in Florida. The Jamaica orange can never hope to rival our Florida fruits unless the seedlings are budded and grafted, and systematic cultivation be given to the trees. At present, orange growing in Jamaica is not very remunerative, as the markets have become limited by the increased supplies in this country; but there is always a chance of a sudden change for a year or two when the Florida crop is injured by the frost. In fact, the catastrophe of two winters ago has made the Jamaica growers more hopeful than ever before, and as some believe that Florida will never raise as many oranges again as in the past, because of the risk by frost, the planters of Jamaica are setting out many new orchards and improving the old, neglected ones.

Mandarins and tangarines have recently been raised successfully in Florida, and these small "glove oranges" are in popular demand, although they cannot compare in flavor and sweetness with many other varieties. They are introductions from China, but they are now grown in Malta, the Levant, the Azores, and in Florida. They thrive upon small trees, and produce abundantly, but the stock has been successfully worked upon the ordinary orange trees of Florida, making the products of one acre much larger. The culture of these varieties in this country is too limited yet to say whether they will improve in their new home, but dealers already seem to think that they can detect a decided improvement.

Every visitor to Florida or California in the winter season is familiar with the sour and bitter oranges. Many a new comer into either State has been severely taught the lesson that there is a vast difference in oranges by plunging his teeth into a pulpy mass of sour or bitter fruit when he expected to taste a sweet, delicious morsel. Some of the largest and most flourishing trees in Florida produce oranges sour enough to make excellent lemonade, or bitter enough to pucker up the mouth of the most hardened. Originally the woods were full of these sour and bitter orange trees, and the early settlers cut them down as worthless, but to-day they are budded with sweet fruits, to the great profit of the owners. A wild "Indian grove" of sour or bitter orange trees is no longer to be picked up for a mere song. No resident of Florida is ignorant of their value.

The bitter orange was the original Seville orange brought over by the Spaniards, while the sour orange is the ordinary sweet orange allowed to run out through neglect. The latter can be improved by culture, but the bitter orange is a distinct variety that can be made marketable only by budding and grafting. By some writers the bitter orange is considered the original of all our cultivated fruits; but as there is a dispute on the point, it may be well to quote two opposite opinions, and let the reader take his choice.

"There is no instance of a bitter orange tree from seed of sweet oranges, nor of a sweet orange tree from the seed of bitter oranges," says Gallesio, who observed these results for sixty years on orange trees around his town of Finale. Directly opposite to this is the following statement of Mr. Macfayden, author of the "Flora of Jamaica:" "It is a well established fact, familiar to every one who has been any length of time on the island, that the seed of the sweet orange very frequently grows up into a tree bearing the bitter fruit, numerous well-attested instances of which have come to my own knowledge. I am not aware, however, that the seed of the bitter orange has ever grown up into the sweet fruited variety."

Roentgen and His Rays.

Prof. Roentgen has again made a communication to the Royal Academy of Sciences on his great discovery, says the Lancet. He states that while the X rays are passing through the air they traverse it in every direction. When a plate, impervious to the rays, is placed between a fluorescent screen and a source of the rays, so that the screen is overshadowed by the plate, the platinocyanide of barium nevertheless becomes luminous, and this luminosity is visible even when the screen lies directly upon the plate, so that one might imagine that some rays had traversed the plate; but if the screen placed on the plate is covered by a thick piece of glass, the fluorescence becomes weaker and disappears completely when the glass is replaced by a cylinder of lead 0·1 centimeter (equals $\frac{1}{25}$ of an inch) in thickness surrounding the fluorescent screen.

Prof. Roentgen's explanation of this phenomenon is that X rays emanate from the irradiated air. He considers that, if our eyes were as sensible to the X rays as to ordinary light, the appearance would be as if a candle were burning in a room filled with tobacco smoke. Prof. Roentgen has, moreover, invented a new apparatus for measuring the intensity of the X rays. He has succeeded in ascertaining by means of this apparatus that the intensity of the rays is influenced: (1) by the course of the primary current; (2) by the interposition of a Tesla transformer; (3) by the rarefaction of the air in the tube; and (4) by some other agencies not yet known. He concludes: (1) that the rays issuing from a discharging apparatus consist of a mixture of rays of different absorbability and intensity; (2) that the combination principally depends on the course of the discharging current; (3) that the absorption of the rays varies according to the absorbing medium; and (4) that as the X rays are produced by the cathode rays, and have similar fluorescent, photographic and electrical qualities, it is very probable that they are both phenomena of the same nature.

Gophers Destroy a Canal.

An Oklahoma City enterprise has been ruined by the gopher pest. It was thought that the rapidly flowing North Canadian River could be used to operate all the mills that could be placed on its banks at Oklahoma City. The fall was nearly thirty feet and it was expected that 2,000 horse power would be developed. A canal five miles long was constructed, at an expense of $40,000. It was diked part of the way and the river was crossed twice. The canal is twenty-five feet wide and four feet deep, and when four inches of water was let in at the head gate an electric light plant and a large flouring mill were run with ease, but an unsuspected enemy soon caused disaster to the enterprise. The banks of the canal were of porous, sandy soil and gophers attacked the dike, the holes which the animals burrowed quickly widened into crevasses and the sandy dikes were easily swept away, causing constant and expensive repairs. Finally the entire canal became wrecked, and farmers are now plowing up the right of way and the canal is gone.

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Correspondence.

On the Strength of Emulsions for Killing Insects.

To the Editor of the SCIENTIFIC AMERICAN:

In the article entitled "The Annual Battle with Insects" in the SCIENTIFIC AMERICAN of July 10, just received, the recipe for kerosene emulsion is so concentrated as to be disastrous in its results if used as given. After thoroughly emulsifying this by repeatedly pumping it through a small force pump, it should be diluted with from ten to fifteen parts of water before use.

ALFRED E. HALL.

The New Supplement Catalogue.

To the Editor of the SCIENTIFIC AMERICAN:

We have received the bound copy of your SCIENTIFIC AMERICAN SUPPLEMENT Reference Catalogue. We have found its predecessors very valuable aids in our library and constantly in use. We judge from a casual glance at the new book that it is intended to absorb the former editions, and in that case you may send us, with bill for 25 cts., another copy. We have full sets of your three publications (SCIENTIFIC AMERICAN, SCIENTIFIC AMERICAN SUPPLEMENT, and SCIENTIFIC AMERICAN Building Edition). We have a large collection of engineering books and periodicals, but nothing more valuable or more frequently referred to than the SCIENTIFIC AMERICAN SUPPLEMENT.

CHARLES ORR, Librarian.

Case Library, Cleveland, O., July 9, 1897.

Forcing Plants by the Use of Carbon Dioxide.

To the Editor of the SCIENTIFIC AMERICAN:

Geology teaches that the enormous difference between the luxuriant vegetation of the carboniferous era and that of our time is due entirely to the difference in climatic conditions.

During the carboniferous era the temperature was much higher than at present; moisture was more evenly distributed, and the atmosphere contained 7 or 8 per cent of carbon dioxide, while it now contains only about 1 part in 2,500.

The keeper of the modern greenhouse, in order to feebly imitate nature in the production of luxuriant vegetation, restores two of the climatic conditions—heat and moisture.

The result, of course, is gratifying; but how much more so might it be did he not entirely overlook the third and possibly the most important condition, viz., the carbon dioxide?

We find in all we undertake that the closer we imitate nature the better results we secure. There is no reason to suppose that the artificial rearing of vegetables is an exception to the rule.

Nearly all greenhouses are heated during the winter months in some form by the combustion of coal. The product of this combustion, if the soot were removed, is nearly all carbon dioxide. If an ordinary greenhouse were made approximately airtight and the carbon dioxide from the furnace conducted into it, the other conditions of temperature and moisture being maintained as at present, we should have, on a small scale, the climate of the carboniferous era, and we might hope to imitate—also on a small scale—its rapid production of vegetables.

The foregoing is offered through the columns of the SCIENTIFIC AMERICAN as a suggestion to some one who may have the time and opportunity to make an experiment of the kind suggested.

WILLIAM P. STEWART.

[Our correspondent is referred to standard works on physiological botany for the details of experiments upon the supply of a larger per cent of carbon dioxide to the air in which plants are growing. A practical difficulty in applying the treatment suggested on a large scale to greenhouses would be the impossibility of working in such an atmosphere to care for the plants. It would be certain death to any one entering such a place.—EDS.]

Horseless Carriage Works Burned in Paris.

The works of the Carriage Builders' Society, in the Rue Pouchet, Paris, caught fire on July 12, and sixty horseless carriages were destroyed. The total damage was about $200,000. At present it is believed that the fire was of incendiary origin. It is a well known fact that the Paris cab drivers are very much opposed to the introduction of horseless carriages, which they believe are destined to interfere with their means of livelihood.

Meeting of Electrical Engineers.

A meeting of the American Institute of Electrical Engineers is to be held at Eliot, Me., July 26, 27, and 28. Besides the inaugural address of the president, Dr. Francis B. Crocker, on the "Precision of Electrical Engineering," papers are expected from Prof. Elihu Thomson, Prof. W. E. Goldsborough, Prof. Robert B. Owens, Prof. J. P. Jackson, Charles P. Steinmetz, Putnam A. Bates and Walter C. Barnes, Caryl D. Haskins, Adam Bosch, H. M. Gerry, Jr., Horatio A. Foster, W. H. Freedman, and Herbert Lloyd.

A New Telescope at Greenwich, England.

During the past three or four years the observatory buildings at Greenwich and their equipment have undergone a very considerable change; that is, internally. Viewed from the outside, the visitor approaching it from the railway sees no change. It is only when the steep ascent has been climbed and the entrance gate has been reached that an extra dome or two can be noticed of that green tint peculiar to the place. But once inside the high inclosing wall, it is seen that there is little in common with the building that was erected over two centuries ago for John Flamsteed, the first astronomer royal.

The old building has not been interfered with, but in the grounds to the right a new series of buildings has been erected. A small but handsome red brick building is first seen, in which is a new altazimuth, which has only recently been erected and has not yet been got into working order. Under the largest dome is the 28 inch refractor, which has been in working order now for about two years. The next smallest dome covers the new building, which has been prepared for the new telescope presented by Sir Henry Thompson, now being placed in position. This new building is the initial portion of what will be, when completed, a very handsome block. That which is being got ready for use is a handsome red brick building, to which wings will be added when funds are forthcoming. The observatory being in the hands of the Admiralty Department, the money requisite for improvements is not readily obtainable. The needs of our first line of defense are so great that the Admiralty has not much interest in the observatory beyond depending upon it for its supply of duly attested chronometers for the navy. The 28 inch telescope which was added three years ago was not provided until it was absolutely necessary. And then no building was forthcoming to put it in. Determined not to lose the telescope, which was too big for the building, Mr. Christie devised a new dome, which gave the extra space required. This liberated the old dome, so long a feature of the observatory, and that is now to be used for the new 26 inch telescope just acquired. It is really small for that, but the best will have to be made of it.

The telescope which Sir Howard Grubb has now completed is for spectro-photography. The spectrum, as everybody knows, is a scattering of the different colors of light. The examination of these gives much information as to the body that is being looked at; and it can be done by viewing through an eyepiece. But it is far more convenient to take a photograph, which can be examined at leisure. When the 28 inch telescope was fixed, a spectroscope was attached; but work with that was given up about eighteen months ago, when Sir Henry Thompson promised £5,000 for a special telescope for this work. The new telescope will take some twelve months to get into working order. When it is ready, it will be assigned a special duty. There are, of course, several branches of spectro-analysis which can be taken up. One is to examine the chemistry of objects by the analysis of its light. What will be taken up here is an examination of the spectrum as a means of determining the rate of motion of the body looked at in the line of sight—how fast it is approaching or receding. This is the work which Mr. H. F. Newall has been carrying on at Cambridge with a 24 inch telescope.—St. James's Gazette.

Weight Reduced by Riding.

The following facts were contributed by a civil engineer to the L. A. W. Bulletin, and are of sufficient interest to justify republication:

It may be of some interest and value to our members, or to those afflicted, like myself, with too much avoirdupois, to know of an actual case of reduction of weight by riding a wheel. The weight was taken in the morning after the bath, without clothing and as nearly as possible under like conditions. The scales weighed to half ounces, so the weights may be considered accurate. I have platted the daily mileage made on each day at the bottom of a diagram, to show, if possible, the relation between mileage and weight. In most cases the fall in weight succeeding a long ride is quite marked, and a few days' neglect of the wheel shows a rise in weight.

I would state that on one evening in August, on a three hours' ride, I lost five pounds. On this occasion it was extremely hot, and the perspiration poured in a stream from each sleeve. Under these conditions of copious perspiration, and as copious drinking of water, all rheumatic tendencies disappeared. At present writing, after several months of comparative physical idleness, my weight is eight pounds less than when I began to ride a bicycle in June, 1896. No attempt whatever was made by me to diet. The results are entirely attributable to the wheel. My rheumatism is, however, returning, and I long for the time when the roads will again be passable for a bicycle.

Highest weight, June 15.	223 pounds, 2 ounces.
Lowest weight, September 4	212 pounds, 6 ounces.
Longest ride.	17 miles.
Average daily mileage.	4·25 miles.
Average loss per day	2 ounces.
Greatest loss in one day	5 pounds.

Science Notes.

Sir John Kirke, whose name was associated with African discovery from the days of Livingstone, Burton, Speke and Grant to those of Stanley, has received the degree of doctor of science of Cambridge University.

The Senate has agreed to the provisions in the tariff bill admitting free of duty books in foreign languages and such as are devoted to scientific researches, books and scientific instruments imported for public and educational institutions.

The earliest estimations of the distance of clouds from the earth were made by the Jesuits Riccioli and Grimaldi, at Bologna, says Prometheus. They used the trigonometric calculation from observations at two points, which is still the favorite method.

An Arctic expedition, led by Mr. H. J. Pearson and two other English gentlemen, recently started for the Barents Sea. It will explore Nova Zembla and the island of Waigats as well as the great Tendra of the Samoyeds, from the Ural Mountains to the Petchora River.

The volcano of Kilauea attracted notice on the evening of June 24, by a series of terrific explosions which were felt for thirty miles away. Almost immediately after there was seen, by persons living along the Kau coast, several lava fountains in operation, and the lava lake continues to rise rapidly, and is now about 500 feet deep and increasing in activity.

The Paris correspondent of the Medical Record tells us that in France "ideas regarding the treatment of fevers have undergone a change during the last few years. For instance, considering fever as a symptom rather than as a disease, even in certain specific fevers, French practitioners respect it, as they say. That is, they regard it as a kind of pathological compensation, an effort of nature to throw off morbid process, and hence to be looked upon as benign, and if not actually encouraged, at least left to itself. But it should not be treated actively."

A fire has occurred, of all curious places, in the ice-cold storage vaults of a New York firm. While the firemen were at work a vessel containing ammonia used in the refrigeration exploded, instantly spreading its fumes in all directions. For several hours the firemen fought the flames in the cellars, working in a freezing atmosphere amid stifling smoke and ammonia vapor. Ultimately, however, the fire was subdued. One fireman lost his life, while two were taken to the hospital, suffering terribly from the effects of the ammonia and the intense cold.

A compound of argon and water, in analogy with similar compounds of nitrogen or oxygen and water, has recently been obtained by P. Villard, in the same way as these latter are prepared. At a pressure of 150 atmospheres, argon and water were brought into contact. If then any part of the vessel containing the substances was cooled to 0° C., the thin film of water on the surface united with the gas to form colorless crystals which, at a pressure of 210 atmospheres, were decomposed at +8° C., at 105 atmospheres by a temperature of 0° C.—Comptes Rendus de l'Académie.

East Friesland, abutting on the North Sea, abounds in peat bogs. The beds of peat are in many parts from fifty to sixty feet deep, but owing to the low heating value of the peat, it has hitherto been found impossible to secure a market for it, in the face of the ample supplies of good coal from the not far distant Westphalian fields. The district is very sparsely inhabited, and is without any important industry. Dr. Frank suggests that the peat deposits should be utilized on the spot for the production of calcium carbide. There are large beds of limestone near Rheine on the Ems, and transport thence to the peat moors would be easy and cheap. It is estimated that thirty tons of the peat would furnish the electrical energy necessary for the production of one ton of calcium carbide.

At the French Biological Society M. Arloing has reported some interesting observations on the toxicity of human perspiration. He found as a result of making intravenous injections of natural perspirations, and also of prepared extracts of the same, that when the strength of the injection approached 15 centimeters per kilogramme in the case of the dog and 25 centimeters per kilogramme in the case of the rabbit, death almost always occurred, generally within three days, though sometimes not for some weeks, when it followed upon a state of profound cachexia. The injection of one-sixth, one-quarter, or one-third of the lethal dose led, according to his observation, to immediate and proportional effects. The toxicity varied with the environment of the subject which furnished the perspiration as well as with the mode of preparation of the extract. The perspiration secreted during arduous muscular toil is richer in toxic principles than that secreted during the ordinary circumstances of life, the degree of extra malignancy amounting to 25 or 30 per cent. All things being equal, perspirations obtained by artificial means of sudation present a minimum of toxicity; but perspiration obtained from a subject who has suffered from retention of the secretion due to cold is poisonous.

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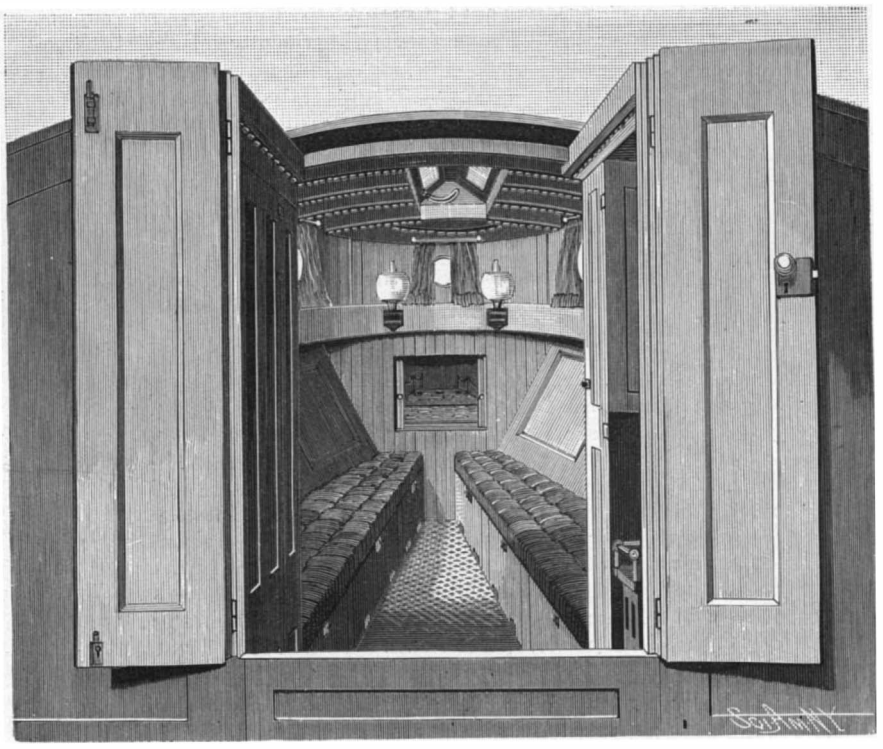
A VAPOR HUNTING LAUNCH.

Sportsmen who are in the habit of spending their vacation in long hunting trips upon the lakes, rivers, and bays where game abounds are well aware that the real pleasure of such an excursion is largely determined by the kind of craft in which it is carried out. A launch or sailing boat that was admirably suited to an afternoon trip, where all that is required outside of safety is seating capacity and a fair measure of speed, might prove to be quite inadequate to accommodate a hunting party of much smaller dimensions. The hunting launch should bear the same relation to the swift pleasure launch that the cruiser does to the racing yacht.

We present illustrations of a hunting launch which has been built for Mr. H. M. Birge, of Buffalo, by the Marine Vapor Engine Company, of Jersey City, N. J. The model follows the lines of a modified Cape cat, and the builders have turned out a craft which will be comfortable in a heavy sea, and maintain a good speed when boats of a finer model would probably be making very bad weather. The full bow and lofty freeboard will make her a dry boat going head to sea, and the general fullness of the lines permits a roomy cabin to be provided, having a good, level floor and plenty of stowage space.



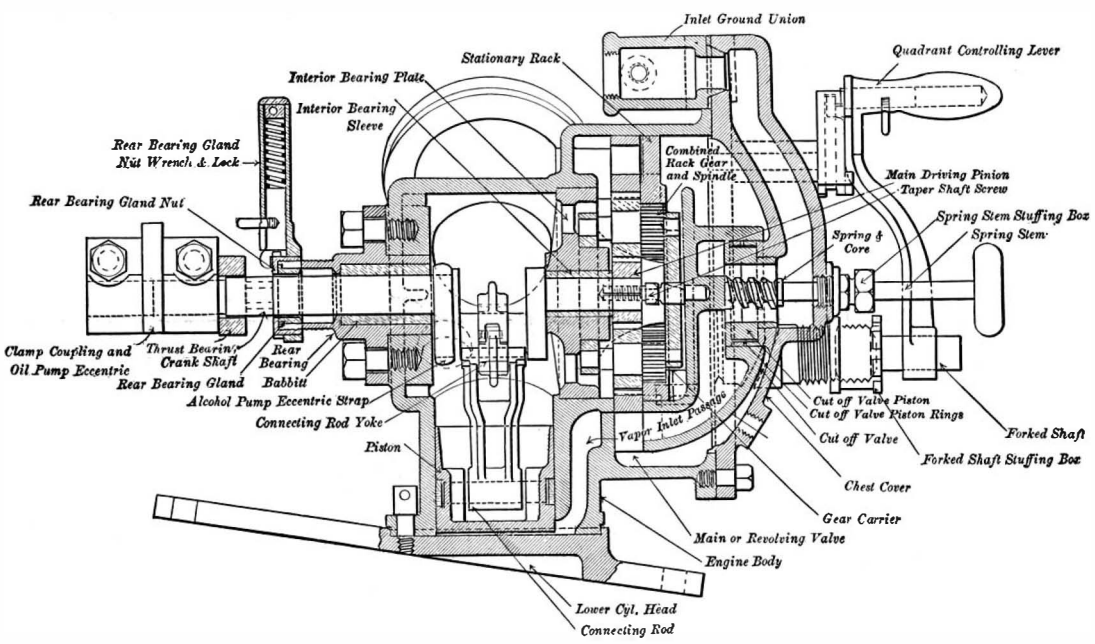
CABIN OF HUNTING LAUNCH.

The dimensions are as follows: Length, 30 feet; beam, 8 feet; draught, 28 inches. White oak was used for the keel and framing; the planking is of selected white cedar and the deck of white pine. For the size of the boat, the cabin is remarkably roomy. It is finished in mahogany, and is lighted with four swinging dead lights which are oval in shape and give proportionately more light than the customary circular lights. On the port side of the after end of the cabin is a toilet finished in mahogany, and on the starboard side is a galley, beneath which are kept the stove and cooking utensils. Adjoining and just forward of the galley is a wardrobe. The cockpit is also finished in mahogany, and beneath the seats in both cockpit and cabin are roomy lockers. There is seating capacity for ten persons in the cockpit and ten in the cabin, and there are also cushions which button down upon the roof of the cabin. An awning is provided which stretches continuously above the cabin roof and the cockpit.

Particular interest attaches to the motive power, in which an effort has been made to combine the most desirable features of the various types of launch engine. The fuel used is any kind of commercial kerosene, and wood alcohol is used in the "retort" or boiler in place of water. After the alcohol vapor has done its work in the engine it is led through a condenser. This consists of 50 feet of 1 to 1½ inch seamless copper pipe, which is placed outside the boat on each side of the keel. From the condenser the alcohol passes into a copper tank in the stern of the boat, from which it is pumped back into the "retort" by a small pump attached to the engine. The same eccentric that works the whistle pump drives a small pump which feeds the kerosene burner below the retort. It will thus be seen that the same supply of alcohol is used continuously, and in a seven horse power engine the leakage is so small that the addition of a gallon of alcohol once in every six weeks or two months is sufficient to maintain a full tank.

The "retort" consists of continuous layers of ¾ inch and 1 inch steel pipe, the lengths, which are threaded and brazed together with great care, being arranged within a polished jacket of neat and compact design. The use of wood alcohol is attended with many advantages. It has a low boiling point of 170°, and the hand may be placed upon the casing of the engine when it is working under 100 pounds pressure; moreover, the engine starts readily as soon as the pressure gage shows 25 pounds to the square inch. The fact that alcohol combines freely with water removes the danger of fire; for, should the tank leak and permit the alcohol to run into the bilge, it would quickly be rendered harmless. There is a further advantage in the small bulk of the liquid that it is necessary to carry.

The propeller is driven by a Wright engine of very compact construction and light weight, the details of which are shown in the accompanying cut. The single crank is driven by three single acting cylinders arranged at 120 degrees. The cylinders, the steam chest and the casing are made in one casting, which completely surrounds the crank and connecting rods. The rear end is closed by the crank shaft stuffing box and the front end by the steam chest cover. The forward end of the crank shaft is carried by a bearing plate, and next to this and bearing against the face of the three steam ports is a circular revolving valve, which, by means of gears, is caused to revolve once to every twelve revolutions of the engine. A cutoff valve is arranged to bear in steamtight contact against the outer face of this valve, the position of the cutoff valve being regulated by the controlling lever shown in the drawing. Limitations of space forbid a detailed description of this mechanism, which is extremely ingenious; but, by moving the controlling lever to the various positions indicated on a quadrant, the engine may be run ahead or run back or stopped; it may be run fast or slow, and with any required degree of expansion. The engine is well balanced, and runs with practically no vibration or noise, and, taken altogether, the motive power is of a type that is well adapted to the unskilled hand of the average amateur yachtsman.



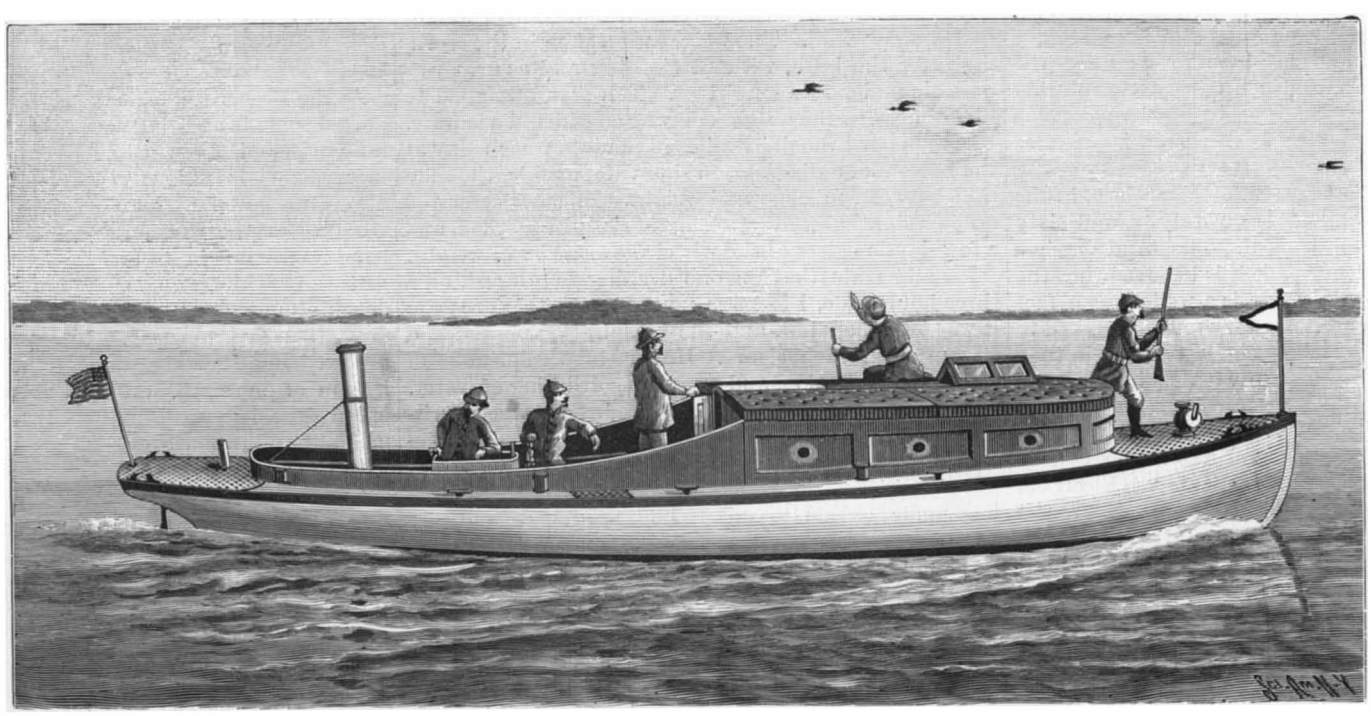
VERTICAL SECTION THROUGH WRIGHT ENGINE.

The Door Spring.

"Truly in no minor feature is the progress of civilization more apparent than in the present common use of the door spring. We don't shut doors now nearly as much as we used to; we don't stop to shut them. We are spared that trouble and we save time. We open the door and push on through and leave the door to take care of itself. In the time that it would have taken us to close it we are six, eight, ten feet off; but the door is not neglected; it shuts itself, calmly, quietly, and with certainty as the man marches away. There is less slamming of doors now than ever, and fewer doors are left open; and the saving of time effected by the use of the self-closing door is in the aggregate tremendous."

A Puncture Cement.

The American Druggist states that a recently patented preparation for the automatic repairing of punctures in bicycle tires consists of glycerine holding gelatinous silica or aluminum hydrate in suspension. Three volumes of glycerine are mixed with one volume of liquid water-glass and an acid is stirred in; the resulting jelly is diluted with three additional volumes of glycerine, and four to six ounces of this fluid is placed in each tire; in case of puncture the internal pressure of the air forces the fluid into the hole in the tire, which it closes. It will be seen from the foregoing formula that wheelmen had much better buy such preparations than attempt to make them.



SEVEN HORSE POWER VAPOR HUNTING LAUNCH.

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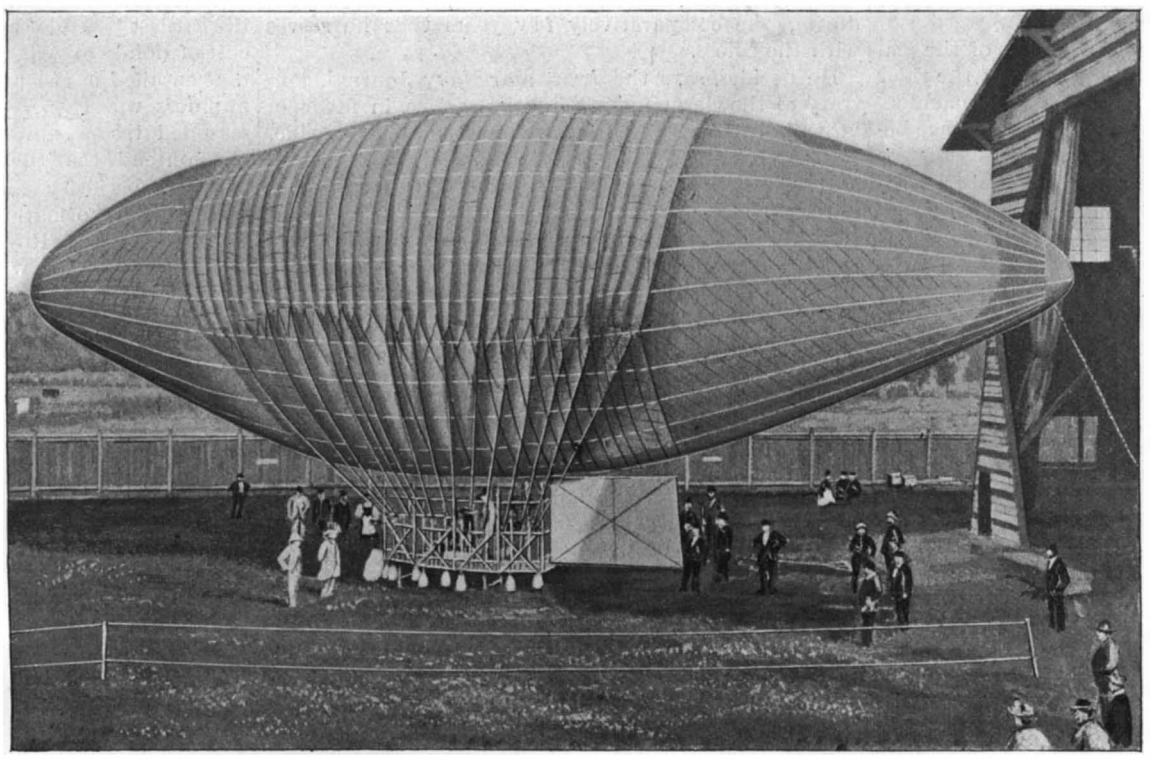
THE EXPLOSION OF THE BALLOON DEUTSCHLAND.

The Deutschland, a balloon of 9,000 or 10,000 cubic feet capacity, of which we give an exact reproduction, was on view at the trades exhibition held at Berlin in 1896. The experimental ascent which took place the 12th of May of the current year, at 7 o'clock P. M., at the Tempelhof establishment, would have been made last year, if at the time the inventor had been able to procure the funds required. Only recently, however, he found the necessary amount at his disposal.

Dr. Woelfert was furnished with several thousands of cubic feet of gas for his balloon by the Prussian government generators. In the preparation for the ascent he was assisted by officers of the aeronautic department of the German army.

The experiment was to consist of a trip to the town of Rixdorf, in the north-northeast, in spite of an opposing wind. The balloon was to return for descent at Tempelhof, after traveling some four miles in a bird's line. In his fatal ascent Dr. Woelfert was accompanied by the mechanic Herr Knobe, who had also been with him throughout the time of the exhibition.



THE STEERABLE BALLOON OF DR. WOELFERT.

The balloon was oblong, and the proportion of length to breadth was 2:5. It was fairly stable when suspended in the air, and, though its shape was not graceful, it was carefully constructed. Unfortunately, in order to increase the power of the mechanism, the doctor had brought the car too near the body of the balloon. It was suspended 10 feet below the reservoir. This defect did not pass unnoticed. The Science Illustrée published an article drawing the reader's attention to the dangers of this construction, and sent a copy to the inventor. But the warning seems to have been in vain. The engine had 8 horse power, and, on the whole, resembled those used on autocars. The fuel burnt was benzoline.

Our second cut shows clearly the details of the construction. The screw propeller was placed in the front, and had two aluminum wings. In the rear was attached a rather large rudder which, to judge from its size, should have been found effective.

According to the Berliner Tageblatt, it appears the balloon took a southerly course, and the machine does not seem to have worked satisfactorily even during the short interval when the screw was seen to be revolving. But scarcely had the attempts at propulsion been begun, when a violent explosion shook the air. Basket and balloon were at once wrapped in flames, and the blazing mass was seen falling to earth with ever increasing speed. The rudder also was caught by the flames, got loose, and reached the ground first. For some seconds there seemed to be danger that the aerial furnace should be precipitated on a goods train laden with hay. This additional catastrophe, however, did not take place.

The military aeronauts were the first to pick up the mutilated and charred remains of the unfortunate balloonists, who, but a few minutes ago, had left the solid earth healthy and strong. As the balloon was 2,500 feet above the earth when the explosion took place, and was still in full ascent, there can be no doubt that the gas, escaping from the valve with too great force, reached the furnace and caught fire. The doctor should have made his experiments with the machine only after reaching the zone of equilibrium.

Following so closely the catastrophe of Lilienthal, this new tragedy seems to point to the enthusiasm with which Germany is taking up the problem of the navigable balloon. The principal error on the part of Dr. Woelfert is the same as that committed by most of the daring men that risk their lives in similar ascents. Their limited means do not give them opportunity to acquire the familiarity required in using with a minimum of risk the delicate contrivances employed. Their impatience and daring are only too well explained when we consider the obstacles they meet at each trial ascent.

We can then only sympathize with them for any errors they may commit, and honor them for the courage they show in the advancement of science. And truly of science they are the martyrs. This glorious death they have met in striving for the common weal.

We are indebted for our illustrations of the ill-fated airship and its heroes to Le Monde Illustré.

The Vienna Tramway Line.*

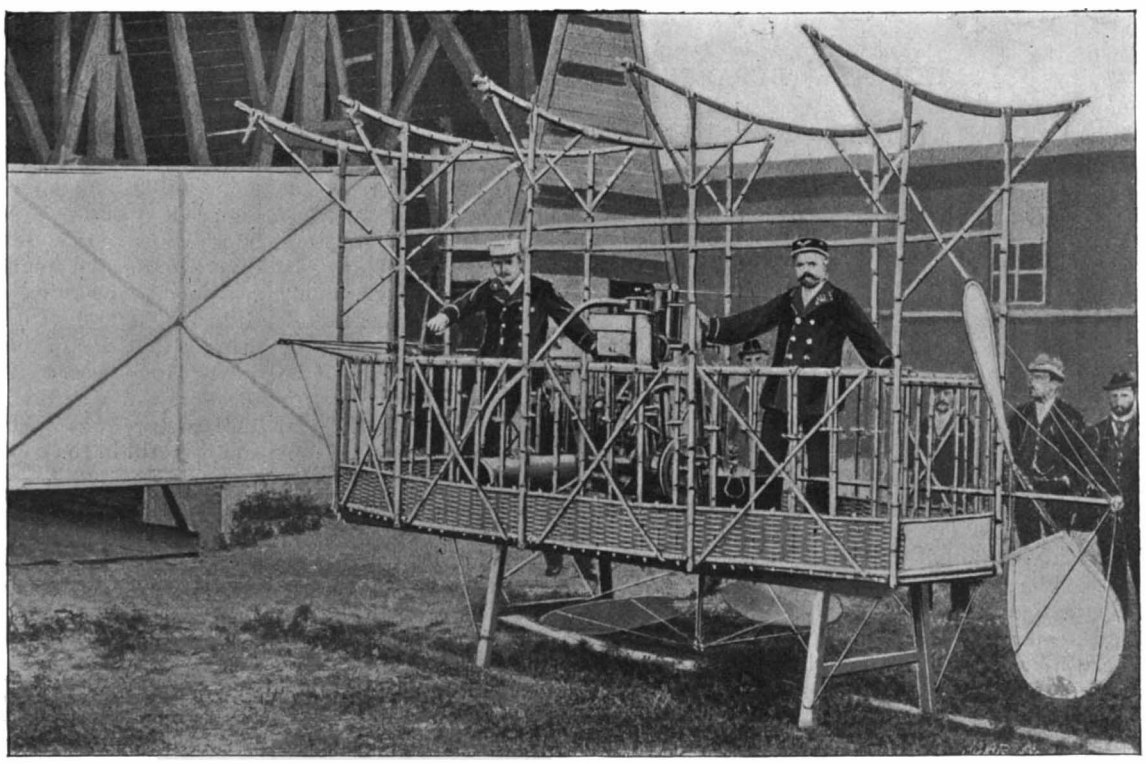
One of the most important of the Viennese tramway lines has been transformed into an electric one. The overhead trolley system has been adopted in spite of the chaos of telegraph and telephone wires above the streets. The line is about six miles long. The work was done by the Union Elektricitäts Gesellschaft (the company owning the German and Austrian Thomson-Houston patents), under the superintendence of their engineer, Herr C. Pollak, in the short space of two months, although the weather was very bad during the period. [The line was opened on January 27.]

The maximum gradient is 3·8 per cent for a distance of about 150 yards. The rails are partly heavy Phenix rails, weighing 86 pounds per yard, and partly Haarmann twin rails 6⅛ inches high. The track is of standard gage, and is mostly in the middle of the street. The rails are bonded with Union bonds 107 sq. mm. section, and are cross connected every 110 yards. The rails are connected to the engine room with a cable of 700 sq. mm. section, and are also fed at a point in the middle of the line with a cable of 350 sq. mm. section. The trolley wire is fed at three points by independent cables. The first point is 2·6 miles distant from the station, and is fed by a cable of 350 sq. mm. section; the second is 0·9 mile from the station, and the feeder has a section of 140 sq. mm., and the third feeder is of the same section and 1·1 miles long. The feeders are underground, laid directly in the ground, and armored with iron ribbon. Current is delivered from the lighting central station, a special 550 volt shunt dynamo and switchboard being devoted to the tramway circuits.

The trolley wire is at a height of about 20 feet above the ground. It is of hard drawn copper wire, 8·25 mm. diameter. It is supported at 643 points, in 312 places by poles and in 331 places by rosettes. In most cases house owners consented to the rosettes being fixed to their houses, so that poles have only been used where it was absolutely necessary. The poles are of steel tube, and are set in cement foundations. The rosettes are ornamental steel castings, inclosing India rubber silencers.

The line and rails are divided into seventeen sections, insulated from one another, which are switched in series under ordinary working conditions. Each section has a Thomson-Houston lightning protector with magnetic spark extinguisher. Almost the whole length of the trolley wire is protected with guard wires.

There is to be a four minute service by means of twenty-five motor cars. In addition there are five cars in reserve. All are of the same type as the Hamburg cars, having a double axle under-frame with a wheel base of 5 feet 8 inches, and a roomy carriage body with twenty seats. The interiors of the carriages are lit by six 16 candle power lamps. The head lamps are also electric, but each car carries a petroleum reflector lantern, to be used in case of emergency. Each car has two 20 horse power Thomson-Houston single reduction motors. In addition to the ordinary brakes, each car is fitted with a short circuiting brake. The car equipment also includes an apparatus for sanding the track, signal and alarm bells, and a tool box. The cars are heated with briquets in the usual manner. Each car can draw an adapted horse tramcar, both being fully loaded, at a speed of nine and one-quarter miles an hour.



THE CAR AND MOTOR

* Abstract of an article in the Zeitschrift für Elektrotechnik, January 1, 1897.—By the Electrician.

Smoke and Storms.

The following interesting results, says the Literary Digest, have been reached by Herr Kasner, of Berlin, from a study of the periodicity of storms in Germany: "During the years 1883–92, storms at Berlin show a maximum frequency on Thursdays and a minimum frequency on Mondays. Observations made, also at Berlin, from 1830 to 1840 and from 1848 to 1891 indicate a maximum on Saturday and a minimum on Sunday, a fact that has also been observed at Aix-la-Chapelle. New researches, covering other cities, and published in Das Wetter, lead Herr Kasner to the conclusion that in general the frequency of storms increases from Monday to Tuesday, and that a minimum occurs on Thursday, or on some day immediately following. In industrial cities that contain large numbers of furnaces there is almost always an increase from Wednesday to Saturday and a diminution from Saturday to Sunday, while in localities where there are no factories the contrary is generally the case. Variations in atmospheric electricity seem to be connected with variations in the quantity of smoke emitted into the air, as Arrhenius and Ekholm have already noted."

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A SIMPLE AND EFFICIENT BICYCLE BRAKE.

The accompanying illustration represents a new bicycle brake which is absolutely automatic, requires no effort on the part of the rider to apply or release it, and gives complete control of the wheel either for slackening up or coming to a full stop suddenly in case of danger from obstruction of any sort.

This is accomplished with no conscious effort on the part of the rider, and the braking action is smooth, sure and positive.

It adds practically nothing to the weight of the machine, in no way interferes with the action of the rider and its presence is not noticeable when on the machine.

It is applied to the rear hub, occupying the space between the sprocket and the fork, and consists of two pieces, viz., an expansion ring and an internal friction-faced drum, which are brought into action when the rider ceases to impel the pedals and simply holds back, the retarding of the rear sprocket causing the expansion ring to frictionally engage the inner surface of the drum, the latter being held against rotation.

Fig. 1 shows the hub of the machine with the sprocket screwed off.

Fig. 2 represents a small collar which is screwed on in place of the sprocket, thus fitting the hub to receive the brake.

When the brake is manufactured as part of the machine, the flange and lug on collar (Fig. 2) are formed upon the end of the hub in place of the present screw thread, and all screw threads upon the hub or sprocket are therefore eliminated.

Fig. 3 shows the sprocket with the center cut away to fit over the collar, Fig. 2.

Fig. 4 shows the expansion ring, which is of spring steel, finely tempered, with projection at one end fitting in the slot cut in the sprocket, its other end abutting against the lug on the collar, Fig. 2.

Fig. 5 is a locking ring, which takes the place of and dispenses with the present check nut.

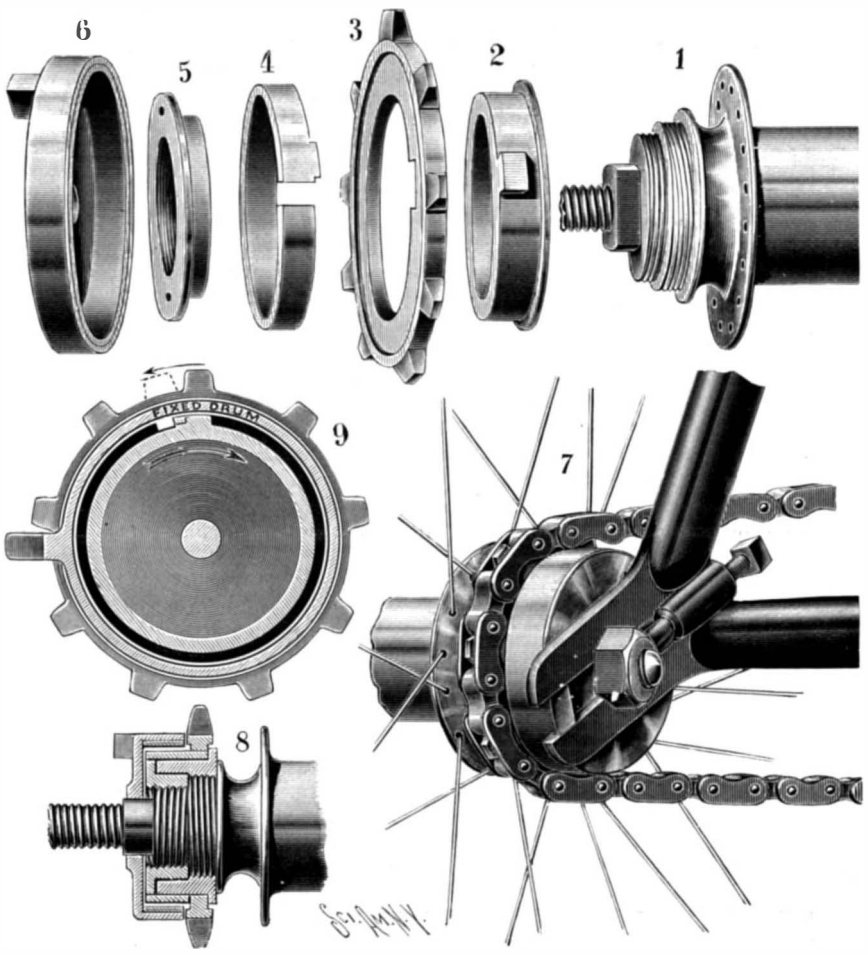
Fig. 6 represents the internal friction-faced drum, which slips over the parts when assembled and is held from turning as shown in the perspective drawing.

From the above description it will be seen that the brake proper consists of but two parts, Figs. 4 and 6, the other pieces being simply to replace similar parts found in the present bicycle construction. The entire weight of the parts added is about three ounces, and in some machines much less.

Figs. 7 and 8 are views in perspective and cross section of the brake assembled on the wheel.

Fig. 9 is the plan of the brake, with the cover of the drum cut away.

The brake has already been adopted by some of the leading manufacturers, who form the hub as above described to receive the brake; but when furnished for application to wheels already in use, the parts are assembled upon an interchangeable rear sprocket, so that all the rider has to do to avail himself of the advantages of this brake is to unscrew the old sprocket and screw on the new one.



THE NEW DEPARTURE AUTOMATIC BICYCLE BRAKE.

In operating there is no back lash whatever of chain or sprocket, and no backward motion is required to set the brake on firmly, this being accomplished by simply holding back on the pedals.

The power of back pedaling is simply increased many times with no conscious effort on the part of the rider, the brake simply operating to hold the machine under control.

It is obvious that resistance may be applied gradually or suddenly, and graduated from zero to absolute rigidity smoothly and with no strain on the working parts of the machine or pressure on the bearings.

When not required, the brake is entirely out of the way, and out of mind. There being no necessity for changing position of the hands or feet in the application, the rider never loses control of the wheel for an instant, the brake simply acting as "material impulse," or a silent assistant in developing muscular power.

The brake is being introduced by the New Departure Bell Company, which owns patents in all parts of the world. Its general selling agents are John H. Graham & Company, 113 Chambers Street, New York City.

A Prize for a Sun Dial.

The National Sculpture Society announces that, through the generosity of Mr. T. Kelly, of New York, it is enabled to offer prizes of $500 and $250 for the best design for a sun dial. The designs are to be exhibited at the society's exhibition in 1898. It is expected that a large number of designs will be submitted. A sun dial is a very effective ornament to a lawn, and they are scarce in the United States, though very common in England. It is to be hoped that this competition will revive interest in the sun dial.

The Weapons for Modern War.

Gen. Dragomiroff, in an article in a Russian journal, lays down the axiom that the simpler and more uniform cannon and rifles are, the better they are. Weapons should be selected which will meet the practical requirements of the battlefield, and at the same time be sufficiently simple in mechanism to allow of the conscript, especially the artilleryman, becoming thoroughly efficient in the handling of his weapons during the comparatively few years that he serves with the colors.

He decides, says the Army and Navy Journal, contrary to the German and English practice, in favor of large bores and small guns, the 8 millimeter rifle, the 6 inch or 15 centimeter cannon for sweeping fire, and the 3·42 inch, or 85 millimeter, cannon for plunging fire. These are the only two varieties he would admit into field or horse artillery, treating the field mortars on wheels as a separate corps to be used only in face of an army in position. Six horses can drag a gun as fast as eight and faster than four; therefore, the weight of the gun, carriage and equipage must be precisely that weight which six horses can drag at top speed. The 4 pounder gun (85·5 millimeter) throws a shell that scatters almost as many fragments as the 9 pounder (105 millimeter), while its accuracy for direct fire is infinitely greater, and the amount of ammunition or projectiles that can be carried with it is proportionately greater. The projectile that hurls the greatest number of fragments over the widest possible area from the bursting point is the most efficient. For the greatest possible effect there must be troops at hand to turn to the best account the momentary loss or confusion artillery fire may have produced. For engagements spread over a wide area the influence of cavalry supplementing or supporting artillery is likely to prove decisive. To derive the fullest possible advantage from these circumstances artillery must be mobile, and the faster it can move, the greater will be its merit. Instead of artillery preparing the way for a battle, as in the days of Napoleon, it is destined to take an effective part in the earliest, middle and latest stages of any encounter. The practical difficulty will be to keep up the supply of ammunition, and that will, of course, be simplified by the light shot.

For rifles Gen. Dragomiroff decides in favor of the large bore—that is, comparatively large. Accurate shooting is important, but still more important is the effect of the bullet which is deadly in proportion to its bursting or splintering. The pencil bullet goes clean through a man, and unless it traverses en route the heart or the brain, he comes on almost uninjured; but the large bore crumples up on contact with the human frame, and spreads the injury over a wide surface, or, in other words, completely disables the man struck. The minimum effect of the small bore bullet destroys the firer's confidence in his weapon, and leads him to fire the more rapidly, because he is convinced that two or three shots are required to disable an adversary charging home. The result of this tendency is not greater slaughter, but merely a waste of ammunition. Except for sudden surprise encounters at short distances, which rarely happen, troops armed with the 8 millimeter rifle, and a magazine of five cartridges, will be more than a match for others equipped with the 3 millimeter and seven cartridges. Lastly, the gun will carry a stouter and more formidable bayonet, which will give the troops possessing it a tremendous advantage at close quarters. Gen. Dragomiroff is one of the commanders who hold that the secret of modern tactics is the necessity of coming to close quarters with infantry as well as cavalry at the earliest possible stage of a pitched encounter. The cost of doing so will, he maintains, be far less than that entailed in the attack on fortified positions, and numbers will then, especially when combined with seasoned troops, always avail to turn the scale. He also contends that the losses entailed in acquiring this tactical superiority can easily be wiped off against an enemy whose formation is broken or who is compelled to retreat. The Russian general believes that the new era of warfare will be marked rather by extensive surrenders on the field of battle than those human butcheries for which the world has been invited to prepare its stoicism and indifference.

Franklin's House in Passy.

A memorial tablet was unveiled on March 8, 1897, in Passy, Paris, to mark the site of the villa that was occupied by Benjamin Franklin during his mission to France in 1777 to 1785. Several hundred persons were present to take part in the ceremony and to listen to the presentation speech which was made by M. Manuel, president of the Passy Historical Society. The American ambassador, Mr. J. B. Eustis, acknowledged the gift of the memorial by an appropriate speech. M. Faye, a member of the French Academy, spoke of Franklin's scientific researches and called him the greatest example of self-education the world had produced. When Franklin, as a commissioner of the newly established American confederation, arrived in Paris in 1776, France had not as yet recognized the independence of the revolting colony, and that government was forced to carry on intercourse with the American agent with great secrecy, in order not to arouse the suspicions of the British ambassador. Shortly after Franklin's arrival he was waited upon by a gentleman who seemed, in spite of his unofficial character, to be in reality an agent of the court. This gentleman, M. De Chaumont, pressed upon Franklin's acceptance an unoccupied house on his estate in Passy. The house had been purchased only a few months before. It is well known that Franklin was very careful never to place himself under obligations to strangers, and the fact that he readily accepted M. De Chaumont's hospitality seemed to be evidence that the commissioner was well aware that his real host was the king. Passy was an ideal place for him to carry on his communications with the ministry, which were obliged to be carried on with the utmost secrecy. It was in this villa at Passy that Franklin wrote the larger part of his unique autobiography, and where he wrote those remarkable letters to American friends. Here also he composed important scientific monographs, and here Franklin placed the first lightning rod in Europe. After he left Passy, in 1785, the house remained tenantless. In 1866 nothing but ivy covered walls and fragments of the ornamented façade remained. The ruins were finally demolished by the Germans in 1870. In New York, in 1865, a fair was held for the relief of the sick and wounded in the war. Victor Hugo's contribution to the fair was a sketch of the Passy villa accompanied by an autograph letter. This picture was sold to the late Samuel J. Tilden, and it is still in the collection which he made.

Intelligence of a Horse.

Dr. W. H. Watkins, of New Orleans, according to the Times-Democrat, relates that while a student, in a class where it was customary to wear a distinguishing badge, and a number of the students being one day gathered on the campus, a horse came limping toward them. "He came to a stop a dozen or more feet away, and, carefully surveying us, finally made up his mind as to what he wanted to do, and without any hesitation limped directly to my side, whinnied, stuck his nose against my body, and held up his left foreleg. Looking down, I discovered a large nail embedded in the frog of his hoof. This had evidently caused the lameness. I extracted the nail and the horse whimpered with relief and walked away. Rather curious as to why the beast had picked me out to attend to his wound, I glanced at the boys and found the solution to the problem. Not one of the group had his medical badge upon his coat but myself. The horse had recognized the insignia and acted accordingly."

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THE CALIFORNIA FLYING FISH AND ITS ENEMIES.

BY C. F. HOLDER.

In the waters about the offshore islands of Southern California, and along the California coast, is found a fish locally known as the tuna and to science as Orcynus. It is remarkable for its vigorous assaults upon other fishes, especially the flying fishes, which constitute its favorite food. The tuna ranges in weight from seventy-five pounds to nine hundred or more pounds, and ranks as the largest of the bony fishes; but the average weight is one hundred and fifty pounds. In appearance the fish resembles a mackerel, being long and finely built, adapted to speed and vigorous motion.

My first experience with the tuna was at Santa Catalina Island, where during the summer months they apparently lie off the north and south ends of the island, coming inshore generally late in the afternoon, and sometimes at night, driving in the flying fishes (Exocœtus californiensis). Standing on a hill, above the little town of Avalon, perhaps six hundred feet above the water, which was without a ripple, I suddenly saw, some distance to the south, a patch of foam, embracing perhaps twenty acres or more. There was not a breath of wind, yet, in some mysterious way, the sea was being worked into foam, a white, silvery mass covering the surface. It was moving gradually up the channel, and knowing that it must be occasioned by a large school of fish, I hurriedly descended to the beach, took a boat and rowed out, and was soon drifting directly in the path of the oncoming foam. The cause now became evident, as large fishes, from four to five feet in length, were seen leaping in every direction. They would rise from the water directly upward, like arrows, six or eight feet, possibly more in some instances, then turn gracefully and drop, head first, into the sea.

In a few minutes I found myself in the center of this piscatorial high and lofty tumbling, and could see that if a tuna of large size should strike my light boat in the downward fall it would pass through it. The fish dashed about within fifteen feet of me, without, apparently, noticing the boat. They were charging a school of flying fishes, which they had driven up the island, and the latter were frequently in the air, passing this way and that, like quail flushed by dogs.

Never was a better opportunity afforded to observe the movements of these, the largest of flying fishes, some of which were eighteen inches in length. All about my boat the water was filled with their forms, many moving slowly and with difficulty—as though completely exhausted. The tunas swam in every direction, wildly excited, and the white caps which I had first noticed were occasioned by their rushes at the flying fishes along the surface. If the flier was not caught it would impel itself into the air by a vigorous screwlike motion of the tail, which gave to the entire body a vibratory motion which in turn was communicated to the pectoral fins, causing them to vibrate with a tremulous motion a few seconds until the fish was clear of the water from a foot to two feet, when the wings or fins, pectoral and ventral—four perfect parachutes—seemed to be locked or set, and the fish went soaring away.

This remarkable method of escape did not always enable the fish to elude the tuna, which followed, like an avenging Nemesis, directly behind the flier. The latter would soar perhaps three or four hundred feet, then beginning to grow weary, its tail would drop, at which the tuna would make a snap at its prey, but by a vigorous, screwlike movement the flying fish again renewed its flight. This I saw repeated in some instances several times, until the flying fish must have covered an eighth of a mile, when it would drop heavily, literally into the jaws of the voracious tuna.

Scores of flying fishes were in the air at one time, passing in every direction. Noting one some distance off coming toward me, I watched to see if it would turn or avoid me. On it came, about three feet above the water, its large black eyes staring, and its four fins fully expanded and held rigid. It did not deviate a foot to the right or left of my boat, but soared over it within a foot or so of my head, to be caught a moment later by the tuna, which must have passed under the boat as the victim went over it.

The extraordinary leaps made by the tunas were occasioned by their attempts to catch the flying fishes in the air. A tuna in search of prey would suddenly notice a flying fish moving along a short distance above the surface, and would rush directly upward, hurling itself out of water like an arrow. They rarely caught their game in this way, but I observed one rush in which the tuna struck the flier with its head and sent it whirling over and over some feet upward, undoubtedly catching it as it fell.

These tunas apparently averaged from one hundred to two hundred pounds, and in their rushes were marvels of power and vigor. Some idea of their strength can be imagined from the fact that a large one hooked on a line fastened behind a sail boat, which was going before the wind, fairly stopped the boat.

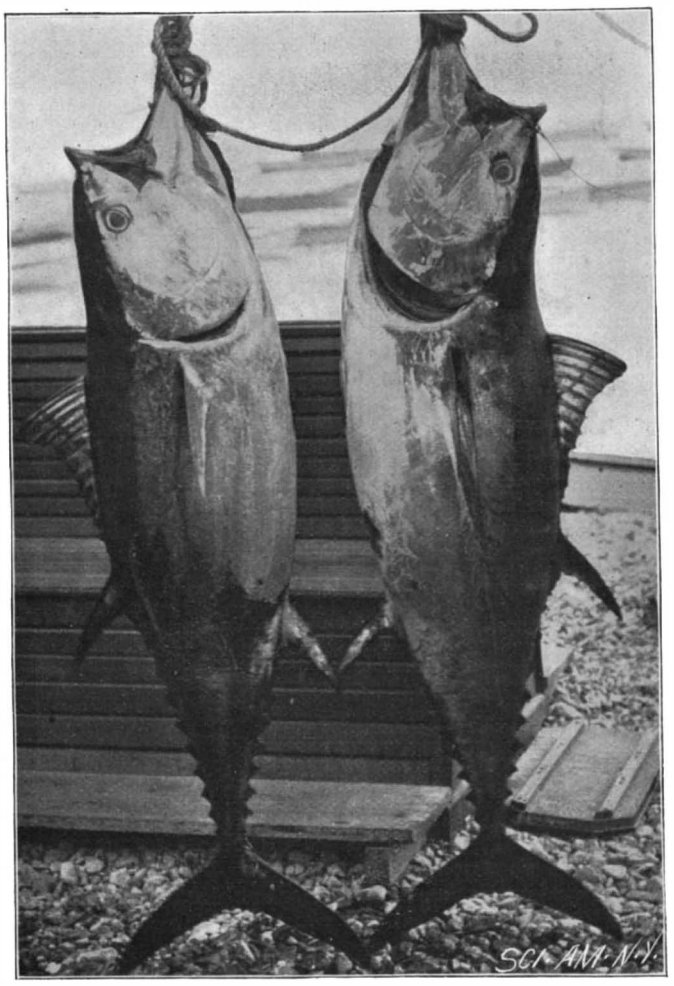
The school in which I was drifting moved slowly up the coast, and continued their depredations as far as the eye could follow them. On another occasion I encountered a school of tunas on the southern end of the same island. A strong wind was coming in from the west which materially aided the flying fish. The latter invariably left the water and soared against the wind, which, as soon as they cleared the water, caught them, raising them in the air like birds, so that they gradually turned away before it with a graceful sweep and dashed along, apparently evading the tunas. The sight of numbers of flying fishes in the air, glistening like giant insects, was a fascinating one, and well illustrated the devices of Nature in protecting her dependents.

On the northern shore of Santa Catalina I have frequently observed the tunas at night dashing into the little bays and forcing the flying fishes in shore, so that often dozens of them would fly out on the beach and into boats.

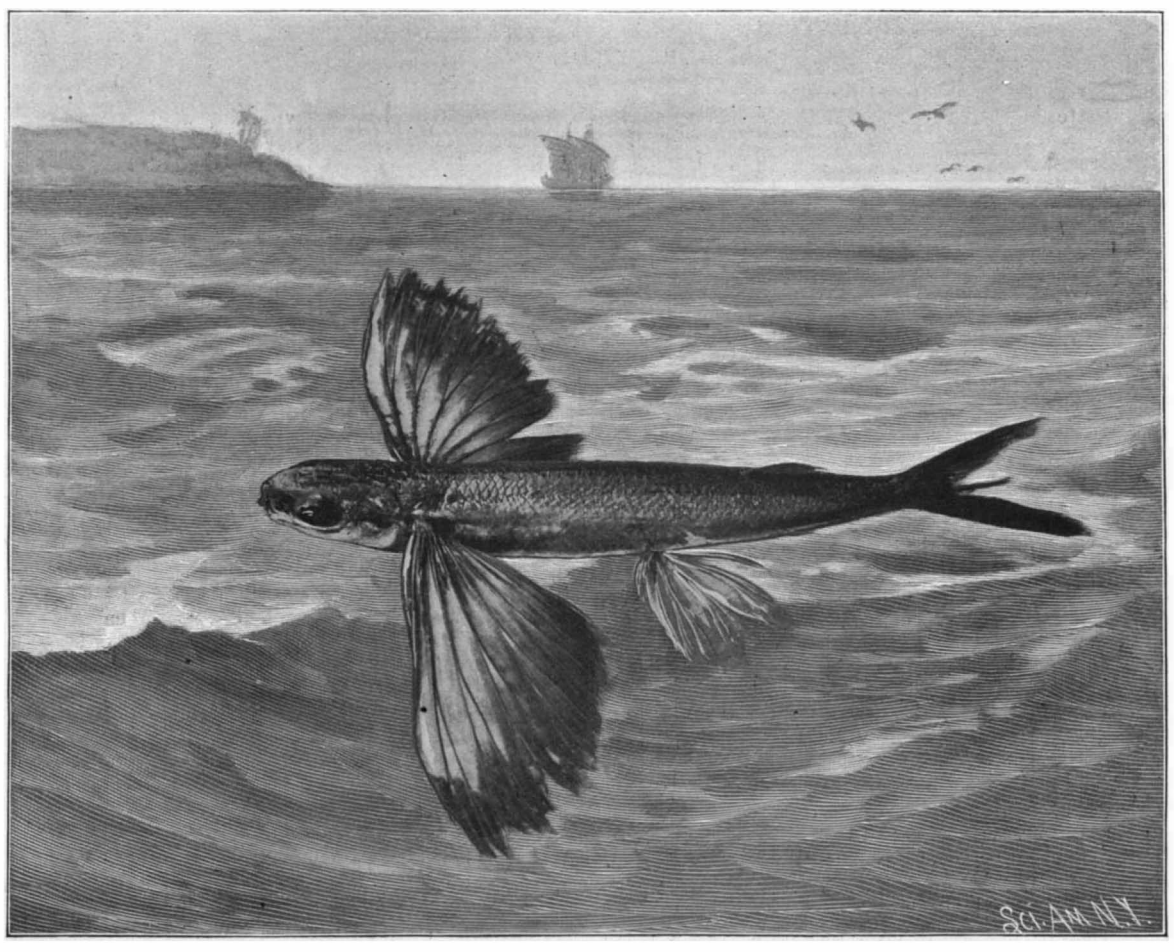
Whether the flying fish has the power to control its movements at such times is an interesting question difficult to decide. In some instances it would appear they have so illustrated this. I have seen a flying fish approach a steamer, soaring two feet above the surface, and when within a few feet of the vessel, dip down and avoid it. But such an instance is very rare. In nine cases out of ten the fish will strike the vessel and drop.

I have had a flying fish cross my boat within two feet of my face, moving on without deviating an inch; and it is not uncommon for the fishermen at Santa Catalina to be struck by these fliers.

As the result of hundreds of observations, I am convinced that the California flying fish does not fly nor move its fins or so-called wings. The fluttering motion is caused by the wriggling of the tail, and when the fish is once in the air its fins are fixed and become parachutes, the action of the fish being identical with that of birds, as the pelican, crow, eagle and condor, which move long distances upheld by the rushing air. In brief, they never beat the fins, but simply use them as parachutes.



THE TUNA (ORCYNUS) OF THE PACIFIC.



THE FLYING FISH (EXOCŒTUS CALIFORNIENSIS) PURSUED BY THE TUNA.

Questions Asked the Smithsonian.

One branch of work done by the Smithsonian Institution, Washington, is very little known, yet it is a very important one from the popular standpoint. This is the answering of questions from all over the United States, on every subject.

Fifty thousand letters are received a year, and none of them are neglected, if it is a question that can be answered. This is the only government which does such a thing.

Prof. Henry inaugurated the system in vogue some forty years ago. He was of the opinion that a well informed man was a much better citizen than an ignorant one, and that it was his duty to impart information whenever requested, whenever such information was obtainable. Of course the questions are of a wonderful variety. For instance, when a New York Sun reporter called at the National Museum recently, he found Prof. Otis T. Mason engaged in finding a suitable name for a country seat for a lady in California. She wanted a name taken from some Indian language. This is only an example of the work done in this line, and sensible questions are always answered, even though they may seem trivial.

The Smithsonian Institution is of great benefit in the distribution of knowledge, its ramifications extending to all corners of the world. Scientists can send the results of their researches to the Smithsonian Institution in bulk, and they forward them to the persons whom they know to be especially interested in the book or pamphlet. This system of international exchange is, of course, extremely beneficial.

A PAPER was read before the Academy of Sciences, on July 5, reporting experiments of the French aeronaut, M. Tatin, at Carquenez. M. Tatin's machine was nearly three times as heavy as Prof. Langley's machine, and had a double instead of a single propeller, and attained a speed of 18 meters (59 feet). The length of the run was 140 meters (460 feet).

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Giants and Dwarfs.

Giants and dwarfs, according to a recent suggestive paper read by Hastings Gilford before the Royal Medical and Chirurgical Society, in London, are not only sufferers from diseased conditions, but from the same disease—that known as "acromegaly" or abnormal development of the extremities. Says the Hospital, in commenting on this paper: "Of course every one admits that some men may be large and others small without in any way departing from the normal in regard to the relation of their different parts, and that we may thus have men who are perfect though gigantic in every part, while also we may have dwarfs who are but men on a tiny scale. But it is pointed out that neither all giants nor all dwarfs are built with such symmetry, and that while tiny dwarfs may have big heads and an intelligence quite precocious, giants are very commonly not built on an equally large scale all through. The idea is then suggested that both dwarfism and giganticism are but diverse manifestations of one condition—disease if one likes so to call it—the dominant feature of which is not largeness nor smallness, but lack of proportion between the different parts, taking different forms according to the time of life when it occurs. Under the name of acromegaly, we know of this as a disease which shows itself as an abnormally large development of the extremities, and it is said that many so-called giants are but specimens of this disease, and that some of them are as small in some parts as they are large in others. On the other hand, in certain cases which were described by Mr. Gilford, while the frame as a whole was small, the head was large, as also were certain parts of the skeleton; and the intellectual development, although not perhaps marked by brilliancy, was at least far more advanced than that of other children of the same age. The possibility of such disturbances of proportion being due to some such morbid condition affecting the development as to deserve the name of a disease is all the more interesting from the fact that, although such cases as those related by Mr. Gilford are undoubtedly rare, no one can walk about in that vast pathological museum which the streets of London form to those who have an observant eye, without perceiving that in a slighter degree signs of partial dwarfism or giganticism are by no means of uncommon occurrence among people who, in one way or another, succeed in earning their living in competition with normal man—if there be such an animal."

The British Medical Journal says:

"Mr. Gilford certainly seemed to establish his point that the two cases—the one described by Mr. Jonathan Hutchinson ten years ago and the other observed recently by himself—were examples of a peculiar form of disease characterized by arrest of development and premature senility. He showed grounds for believing that certain dwarfs who have been exhibited from time to time as curiosities were probably examples of this disorder, possibly in a somewhat modified form. His speculations as to the possible relation of the condition to acromegaly raise a question of much pathological interest, but it may be doubted whether the evidence is sufficiently strong to bear the suggestion that all dwarfs belong to the same class. It seems very possible that we have to do with more than one pathological factor."

Mr. W. Crookes on Diamonds.

Before a meeting of the Royal Institute, London, Mr. William Crookes delivered a lecture recently on diamonds. The London Times gave a report of the lecture, from which we extract:

The lecturer began by giving an account of the South African diamond mines, and, after briefly surveying the chief chemical and physical characteristics of the diamond, proceeded to say that speculations as to the probable origin of the diamond had been greatly forwarded by improvements in the means of obtaining high temperatures. Thanks to the success of Prof. Moissan, they could now be manufactured in the laboratory—minutely microscopic, it is true, but with crystalline form and appearance, color, hardness, and action on light the same as the natural gem. The first necessity was to select pure iron and pack it in a carbon crucible with pure charcoal from sugar. Half a pound of this iron was put into the body of the electric furnace, and a powerful arc, absorbing about 100 horse power, formed close above it between carbon poles. The iron rapidly melted and saturated itself with carbon.

After a few minutes' heating to a temperature above 4,000° C., the current was stopped and the dazzling, fiery crucible plunged in cold water until it cooled below a red heat. Iron increased in volume at the moment of passing from the liquid to the solid state; hence the expansion of the inner liquid on solidifying produced an enormous pressure, under stress of which the dissolved carbon separated out in a transparent, dense, crystalline form—in fact, as diamond. To obtain the diamond from the metallic ingot required a long and tedious process of treatment with various strong reagents, and the specimens thus obtained were only microscopic. The largest artificial diamond yet made was less than one millimeter across. Many circumstances pointed to the conclusion that the diamond of the chemist and the diamond of the mine were strangely akin in origin, and the diamond genesis must have taken place at great depths, under high pressure. How the great diamond pipes came into existence was not difficult to understand. After they were pierced they were filled from below, and the diamonds, formed at some epoch too remote to imagine, were thrown out of a mud volcano, together with all kinds of debris eroded from adjacent rocks. According to another theory, the diamond was a direct gift from heaven, conveyed to the earth in meteoric showers, and the so-called volcanic pipes simply holes bored in the earth by the impact of monstrous meteors.

The Sterilization of Water.

A simple method of sterilizing water has been published by Dr. Schumburg, chemist to the German Army Medical Academy, says the Practical Engineer. He finds that the ordinary means of filtration by portable filters is unsatisfactory, but asserts that a solution of bromide destroys the pathogenic germs, and that the subsequent addition of ammonia renders the water palatable. Dr. Schumburg has made a number of experiments with water to which pathogenic germs had been added, and among them one or more in which a liter of water from the Spree was sterilized by the addition of 0·2 gramme of a solution of 20 grammes of bromine and 20 grammes of bromide of potassium in 100 grammes of water. The bromine is removed by a dose of a 9 per cent solution of ammonia. It is possible that some simple mixture may be devised, the addition of which to doubtful water will render it perfectly safe, so far as the pathogenic germs are concerned.

A Simple Fire Extinguisher.

Hand grenades, the simplest form of fire extinguisher, can be made at home cheaply and easily. And it is well to have at hand a simple contrivance for extinguishing a small fire at its start.

Take twenty pounds of common salt and ten pounds of sal ammoniac (nitrate of ammonia, to be had of any druggist), and dissolve in seven gallons of water. Procure quart bottles of thin glass, such as are ordinarily used by druggists, and fill with this, corking tightly and sealing, to prevent evaporation.

In case of fire throw so as to break in or near the flame. If the fire is in such a place as to prevent the bottle from breaking, as in wool or cotton, knock off the neck and scatter the contents.

The breaking of the bottle liberates a certain amount of gas, and the heat of the fire generates more, thus working its own destruction.

RECENTLY PATENTED INVENTIONS.

Railway Appliances.

EXTENSION CAR STEP.—James A. Campbell, Lenox, Mass. According to this invention the stationary steps of the car are held between two rigid side boards, one end of each of which is extended beyond the stationary steps, and pivotally mounted therein is an extension step with two treads connected by a riser, the step being adapted to swing outward into extended position or to lie directly against the adjacent stationary step. The pivoted step has at one end a gear actuated by a gear on the lower end of a rod extended up by the hand rail at the end of the car, and by turning a hand wheel the step may be extended or withdrawn, a catch operated by the foot holding it firmly in either position.

Electrical.

ARC LAMP.—James J. Walsh, Paris, Texas. To regulate the feed of the carbon-carrying rod there are, according to this invention, two escapement devices, one at the side of the other, and the two being alternately acted upon. The escapement wheels are arranged on one shaft, the teeth of one wheel alternating with those of the other, and pendulum-governed escapement dogs alternately coact with the wheels, the dogs swinging independently of each other, and the resistance being exactly equal between each escapement device. By the slow and regular feed possible with this improvement it has been found that the change in voltage is reduced to a minimum, being scarcely perceptible by voltmeter tests, and at any time of feeding not exceeding two volts.

Bicycles, Etc.

BICYCLE SUPPORT.—James Judge, New York City. To support a bicycle in motion while one is learning to ride, this invention provides for attaching to the rear fork supporting rods, each having a roller at its lower end, the upper end of the rod being attached to an arm which is connected with a member of the rear fork by clamping rings. The supports diverge at their lower ends, extending in a line substantially parallel with the fork members, so that the rollers engage the ground at some distance from the wheel, and the connection between the supports and the fork is readily adjustable to adapt the device to different bicycles.

Mechanical.

DRILL.—Herman Richter, Jr., Jersey City, N. J. This drill has been devised especially for overhead work, and the drill shaft is adjustably secured upon a base with a rolling support, the shaft being made in coupled sections, whereby it may be given the length to reach a ceiling of any height. The feed is controlled at the base of the machine, and the driving mechanism may be readily operated by one standing on the floor. The frame in which the drill shaft is sustained may be given any desired angle to drill a hole at an inclination, and a gage is provided for determining the depth the drill enters a piece of work.

WELL OPERATING POWER.—George W. Grimes, Bluffton, Ind. This invention is for a crank and eccentric mechanism for operating oil well drills or actuating oil pump rods, and affords a simple and economical construction designed to have sufficient strength and rigidity to operate several pumps from a central station. Upon the power shaft is a crank arm, with perforations, and an adjustably mounted crank attachment, in connection with rod-actuating plates, there being also on the shaft a crank wheel, with flanges engaged by rod plates or rings.

Miscellaneous.

CARTRIDGE LOADING IMPLEMENT.—Edwin H. Cant, Honolulu, Hawaii. A simple and compact machine has been devised by this inventor by which cartridges may be loaded, primed and crimped quickly and conveniently, and with safety to the operator. The machine also extracts primers from cartridges that have been fired, and in reloading expands the open ends of the cartridges, smoothing out the crimp and rendering the old shells as readily refillable as new shells. A special form of primer extractors is provided for the long primers generally used with high grade smokeless shells.

CARPET CLEANER.—Kelly Girvin, Brooklyn, N. Y. According to this invention a casing with opposite inlet and outlet for the carpet, and yielding supports therefor, is provided also with a rocking beater and exhaust fan, the arrangement being such that a carpet may be readily fed through the machine and beaten without injury to the pile of brussels and other carpets, and without tearing or injuring ingrains. The dust incident to beating and cleaning is also removed from the body of the machine, and from the portion of the carpet being cleaned as rapidly as it is loosened.

CALKING MACHINE.—Joseph D. Maglin, New York City. For properly calking the decks of vessels, floors of slaughter houses, stables, etc., this invention provides a weighted frame with traveling wheels and calking disks which extend below the wheels, a forked handle pivoted to the frame having downwardly extending arms carrying friction rollers, the latter forming a fulcrum for turning the machine around or moving it to different cracks or seams, into which the calking material is pressed by the disks.

LABEL GUMMING, ETC.—William H. Burland, Punta Gorda, Fla. A device designed to be very serviceable to druggists and others has been devised by this inventor for conveniently and rapidly applying an adhesive liquid to a label to be attached to a bottle. The body is preferably of glass and has a longitudinal trough with two beveled side portions and a scraper, and an overhanging seat adapted to carry a brush, while an upwardly projecting nipple communicates with the trough, and the reservoir has a neck wherein the nipple is received.

PAPER FASTENER.—George H. Bennett, New York City. This is a device preferably made of a single piece of wire or sheet metal, formed with a back having its middle portion pliable, so that it may be bent over and carry the corners of the sheets along, and with loops at the sides and a cross bar connecting the loops. The device is inexpensive and may be readily arranged to clip together a variable number of sheets of paper, etc., without perforating them.

ENVELOPE FASTENING DEVICE.—Edward A. Goodchild, Thompson Falls, Montana. According to this invention, the parts of the envelope or package at which the seal is located are made with graduated perforations or openings in the several flaps, that the seal may have a locking action upon the various folds that may be beneath it, thus avoiding the possibility of an inner flap or fold being opened to gain access to the contents of the package while the package is yet sealed and without disturbing the seal.

WRAPPING COTTON SAMPLES.—Claude H. Robinson, Anniston, Ala. A machine has been devised by this inventor with which a number of samples of cotton may be quickly and compactly done up in a roll between suitable wrappers and tied, forming a parcel to be shipped without injury. The machine comprises folding strips hinged at each side of and extending over a table, in combination with tension-controlled boxes in which a shaft is mounted to turn, wherewith a single attendant may in a short time do up and tie a large number of such parcels.

SHAWL STRAP AND LUGGAGE CARRIER.—Edward A. Lefebre, Jr., Brooklyn, N. Y. According to this invention, a roller is mounted within a cylindrical handle, and from the roller a binding strap and also an operating strap extend outward through the handle, the device affording convenient means for binding shawls, books or packages for carrying from place to place. On one end of the roller is a ratchet wheel engaged by a pawl preventing a reverse movement of the roller, the device affording considerable leverage for operating the binding straps.

BOTTLE AND STOPPER.—William J. Hope, Clayton, Miss. The neck of the bottle, according to this invention, has at its outer end a globular seat adapted to receive a ball stopper, the upper end of the mouth being curved to form a shoulder. The stopper is made of a yielding material, preferably as a hollow rubber ball, and may be readily forced within the mouth by a gentle sidewise pressure, but is securely held in position by the pressure from gas or liquid within the bottle.

CLOSURE FOR BOTTLES, JARS, ETC.—Theodore Diebold, New York City. In this device the stopper is formed with a metal head lined on its under side with cork, and the lining is preferably held in place by a disk made of tanned sheepskin or parchment, designed not to be affected by water or acids. The disk is locked in place by a ring on which are eyes which receive the bail carrying the stopper, and by which the latter is locked in place on the jar or other vessel. The stopper is made to be easily and thoroughly cleaned and not leave any taste on the contents of the bottle or jar.

HAME TUG.—William F. Dale, Bowmanville, Canada. This device comprises a chain attached to the hame and inclosed in a leather casing, a number of links passing through links of the chain and through the casing to receive the trace attachment and act as holders for the trace body. The extra links have enlarged shoulders on their inner side bar which engage the edges of the chain links.

REIN HOLDER.—Robert R. Richardson, Portland, Oregon. This is a simple device for attachment to the dashboard, comprising a base plate on which is a yoke open at one side, a hollow cam having a finger piece swinging in the yoke, and a plate spring extending through the cam, the spring being secured at one end to the finger piece and bearing at the other end against the yoke. The spring serves to hold the cam in yielding engagement with the reins.

HORSESHOE PAD.—Michael Hallanan, New York City. This pad is formed of flexible material, preferably of rubber and leather, and has a transverse recess at the inner side of the heel and a rounded portion at its lower side, there being a back plate over the inner side of the pad. The rounded surface forms a rolling support for the horse's foot, and the pad is especially adapted for horses having navicular disease.

OIL LANTERN.—Julius L. Wandler, Brooklyn, N. Y. This is a cheap and strong lamp more especially designed for campaign purposes. The fount has a central wick and filling neck into which fits an apertured stopper held on the under side of the chimney support, a wick tube being secured to the support and extending through the stopper. The chimney is held between springs extending upward from the support, the handle being attached to the springs.

RECEPTACLE FOR VISCOUS SUBSTANCES.—Francis L. Littlefield, Portland, Me. This is a receptacle for mucilage, glue, paste, blacking, etc., which has a valve-controlled outlet in its bottom. The valve projects slightly below the bottom and is pushed upward when the contents are to be withdrawn, the valve being returned to its seat by a spring when the valve opening pressure is removed.

Designs.

TAPE MEASURE.—Ella G. Brewer, Brooklyn, N. Y. This design comprises floral decorations on the graduated side of the tape symbolical of the four seasons—May flowers for spring for the first quarter of a yard, forget-me-nots for the second quarter, golden rod for the third quarter and holly for the fourth quarter.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co. for 10 cents each. Please send name of the patentee, title of invention, and date of this paper.

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NEW BOOKS, ETC.

TEXTILE WORLD'S DIRECTORY OF THE MILL TRADE AND BUYERS OF TEXTILE FABRICS. Boston: Guild & Lord. 1897. Pp. 360. Price, paper $2, boards $3.

This book contains a large amount of information concerning the textile industry and collateral branches. It contains a complete directory of the textile establishments in the country. Detailed information concerning each material, the variety of goods manufactured, the capacity, etc., is given. All the materials in the town and city are grouped together according to location, and are also alphabetically arranged in another part of the book. The unique feature of the directory is the textile maps of the principal manufacturing States. The volume also contains lists of dry goods merchants, lists of manufacturing clothiers and other consumers buying from first hands, and has also a list of the builders of the machinery and supplies.

NOTES ON QUALITATIVE ANALYSIS. By W. P. Mason. Easton, Pa.: The Chemical Publishing Company. Pp. 56. Price 80 cents.

We have, in this little monogram, the course of study arranged by a professor of chemistry for his students in the Rensselaer Polytechnic Institute. It is compact, well arranged, and has some valuable tables.

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JULY, 1897.—(No. 141.)

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No. 1. Perspective elevation, in colors, and floor plans of a Colonial residence at Overbrook, Pa. A unique design. Mr. Thomas P. Lonsdale, architect, Philadelphia, Pa.

No. 2. Colonial house at Richmond Hill, N. Y., recently erected at a cost of $4,200. Perspective view and floor plans. An attractive and pleasing design. Architects, Messrs. Haugaard Brothers, Richmond Hill, N. Y.

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No. 6. A modern dwelling at Binghamton, N. Y., recently erected for Mr. William Mannis at a cost of $3,000 complete. A good example of a suburban house. Two perspective elevations and floor plans. Messrs. T. Q. Lacey & Son, Binghamton, N. Y., architects.

No. 7. A Colonial residence at Ardmore, Pa., recently erected for Dr. Louis O. Lusson. Perspective elevation and floor plans. Messrs. Boyd & Boyd, architects, Philadelphia, Pa.

No. 8. A Colonial residence at Bensonhurst, Long Island, recently erected for Mr. Thomas A. Ritson. Two perspective elevations and floor plans. A handsome design. Architects, Messrs. Parfitt Brothers, Brooklyn, N. Y.

No. 9. A residence at West Chester, Pa., recently erected for Dr. S. Hagerty. Perspective elevation and floor plans. A design with many excellent features. Mr. Edward S. Paxson, architect, Philadelphia.

No. 10. A residence at Attleboro, Mass., erected for E. P. Clafin, Esq., at a cost of $5,500 complete. An artistic and pleasing design. Messrs. George F. Barber & Company, architects, Knoxville, Tenn.

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References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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(7178) A. L. B. asks how to give photographs a glace finish. A. Apply the prints face down while wet to the smooth varnished side of a ferrotype plate, which should be rubbed with powdered talc, squeezing it by rolling a rubber roller over the back, having blotting paper between the print and paper. When dry it will have a high polish and drop off the sheet. The polish is called glace finish. To mount such prints without losing the gloss, make the following mounting solution: Soak 1 oz. refined gelatine in cold water for an hour, then drain off and squeeze out the water as much as possible; put the gelatine in a jelly pot and place the latter in a pan of hot water on the fire; when the gelatine has melted stir in slowly 2½ oz. pure alcohol, and bottle for use. This glue will keep indefinitely, and can be melted for use in a few minutes by standing the bottle in a basin of hot water. As it contains a very small percentage of water, it hardly affects the gloss of the prints and dries almost immediately.

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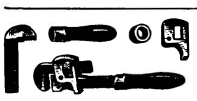

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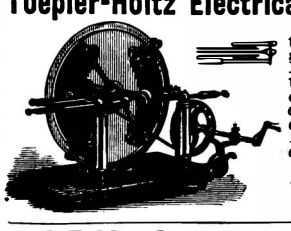

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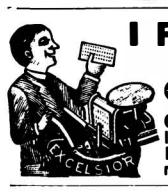

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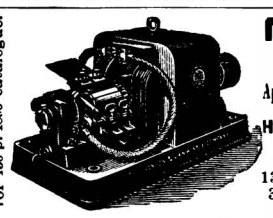

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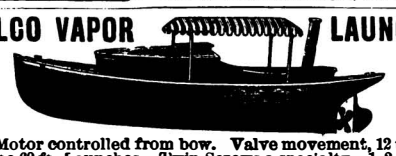

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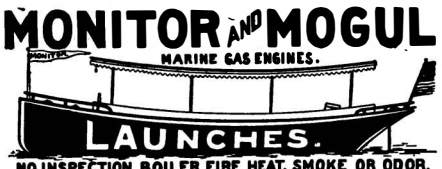

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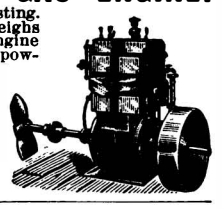

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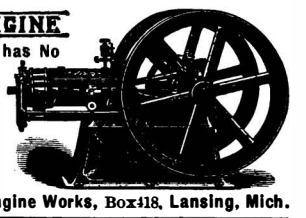

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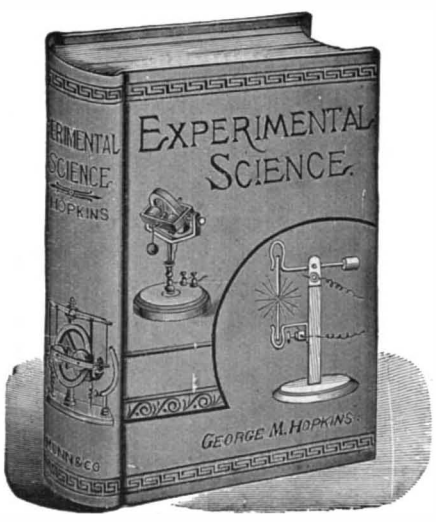

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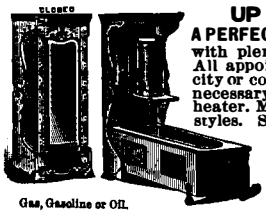

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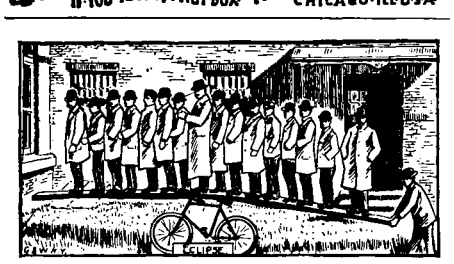

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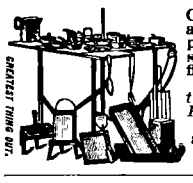

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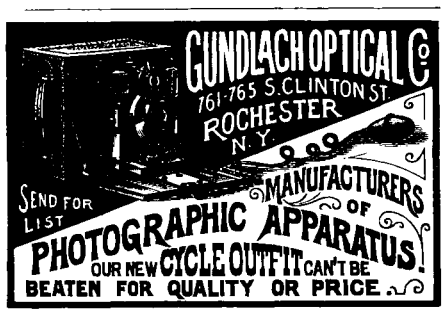

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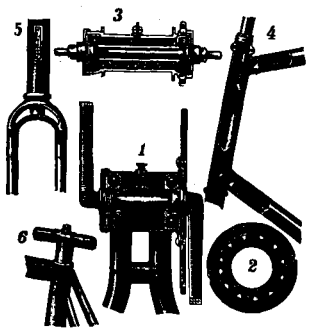

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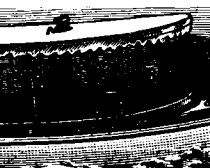

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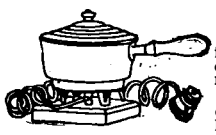

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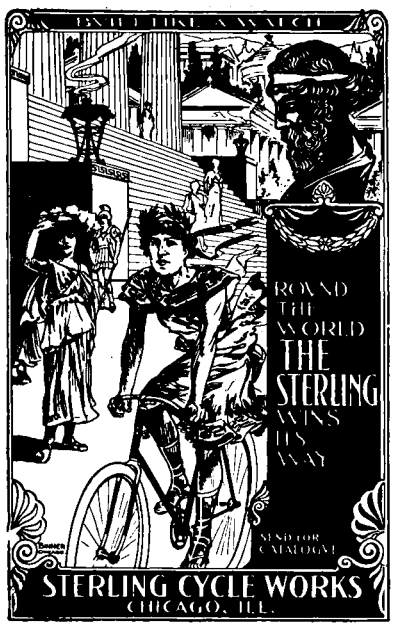

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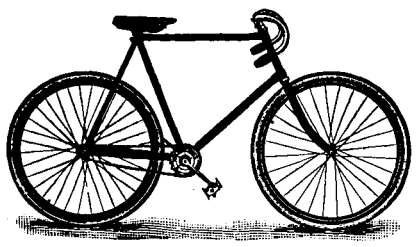

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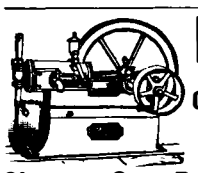

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